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The AUTOMOBILE

English War Office Dictates Many Varied Truck Designs

British Makers Meet Army Specifications—Live Rear Axles in General Use—Chain Drive Becoming Almost Obsolete—Metal Wheels on More Than 50 Per Cent

Motors Are Smaller and Many Governors Are Fitted—Combination Pump and Thermo-Syphon Circulation in Use—Front-Wheel-Drive Tractors Attract Attention—Five-Speed Gear Box Makes Its Appearance

Part II

LONDON, ENG., Aug. 2—After doing without a commercial vehicle show for 5 years England has, since the closing of the recent truck exhibition in Olympia, had an opportunity of retrospecting on the many advances made in truck design since that time, for it must be acknowledged that a show or any form of open competition is the best opportunity the public has of grasping the general trend of advancement.

In such a retrospect it is at once apparent that there have been as many improvements back of the dash as in front of it; in other words, the chassis in general has profited by the engineering talent of the last 5 years as well as the motor.

Live Rear Axle in Vogue

Five years ago Dennis, Leyland and Milnes-Daimler were the only exponents of live-axle constructions, the remainder using chain systems of drive, but today the tables have turned and you can almost count the makers of chain-driven trucks on the fingers of your two hands. Worm-driven rear axles have made phenomenal progress, but the double reduction bevel-spur type of axle has made much progress, particularly since the war office placed its stamp of approval upon it more than a year ago. Inside rumors today declare that soon the war department will similarly place its approval on the various types of worm-driven axles, although these were not specifically ruled against in the war office specifications the same as chain-driven types were. The future of the rear axle is now settled in that it will be a live construction, but the exact ratio of worm-driven to bevel-spur-double-reduction types is not yet settled.

Accessibility of the rear axle is one of the big points in its design. The floating type is conquering, and today the up-to-date truck axle must be designed to have the axle drive shafts removable when the hub cap is removed. The workmanship and materials in these axles are as high class as in the best touring cars. Splined shafts are in general use and accessibility has been so looked after that by the removal of a few nuts and cover plates the entire rear axle driving mechanism can be bodily removed without dismantling the axle housing.

One more tendency back of the dash is the more general use of four-speed gearsets, which is significant in that as the number of speeds in the gearset have been increased the bore and stroke of the motor have been reduced. One maker has gone a step further and is using a five-speed gearset, with a medium-size motor. There is a general tendency to reduce weight in the gearset by keeping the shafts short and using alloy steel in gears and shafts. The gearset with direct drive on third or fourth speed is holding its own, but not a few are following the Mercedes' principle of using a gearset in which none of the forwards speeds are direct, this design having the main-shaft of the gearset in alignment with the motor and the countershaft located beneath it and in alignment with the propeller shaft, with which it connects through a universal joint. This design has the added advantage of having a propeller shaft which is practically horizontal with the vehicle loaded.

Torque Members Show Improvement

More attention has been given to torque members, a few makers combining radius and torque action in one member. The aim with some leading engineers is to carry the torque member horizontal and in the same horizontal plane as the axis of the rear system, this giving a horizontal push from the axle forward where the torque member serves also as a radius rod. Torque members and radius rods are made in large sizes, preferably pressed steel designs with either ball-and-socket or trunnion support at the forward ends.

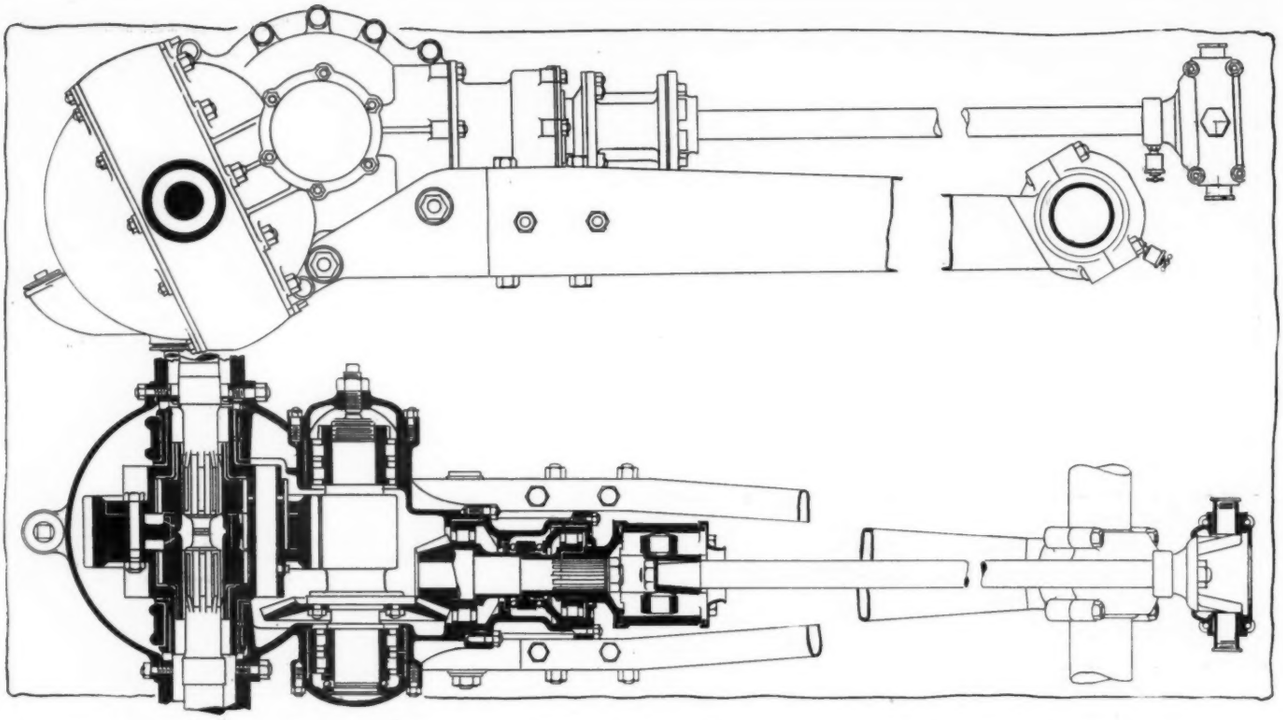


Fig. 1—Horizontal section through Wolseley double-reduction rear axle below with general elevation of axle propeller shaft and torque member above

Fifty per cent. of the models seen at the recent show were fitted with metal wheels, the majority of them using the cruciform type of spoke in preference to the hollow one which has been a much-mooted topic during the past year. One or two concerns are marketing forged wheels, in which the hub portion is one forging, and the spokes seamless tubing, which are anchored between the hub and the forged felloe and secured by autogenous welding. Such wheels, while expensive, are particularly light and are credited with a good excess of mileage as compared with the heavier types of metal wheels.

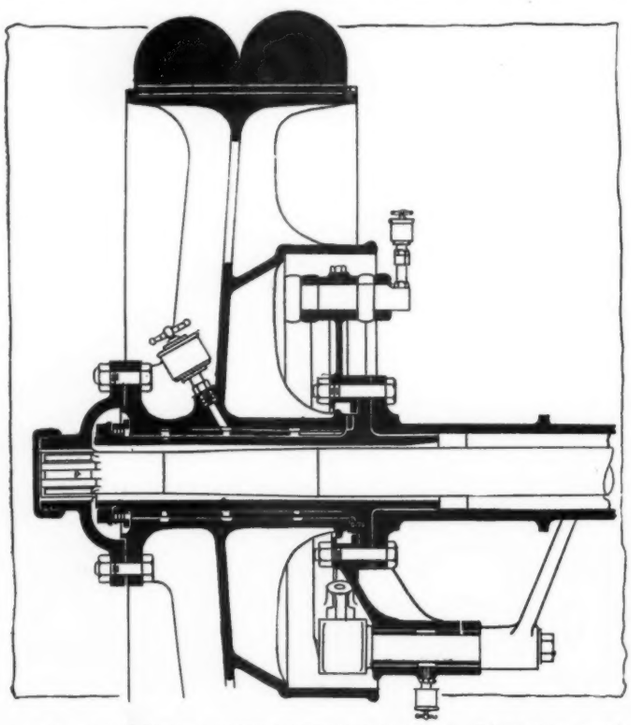


Fig. 2—Horizontal section through rear wheel of Wolseley truck, showing floating axle construction and plain bearing in which a long bushing floats between the wheel hub and the axle housing

A popular type of plain bearing used with metal wheels, and plain bearings for road wheels on heavy-capacity vehicles are gaining in popularity, is to insert in the metal hub of the wheel a steel sleeve. Between this sleeve and the axle spindle floats a bronze bushing filled with radial holes to distribute the lubricant which is fed through a large grease cup. Such bearings are giving very satisfactory service.

These war-office specifications require radiators to be mounted on the side frame members, and as this position often places them abnormally high a few makers have adopted the practise of dropping the frame side members near the front.

The block motor is gaining in popularity, due to its high thermal efficiency, its short overall length and the ability to incorporate manifolds in it. With these designs the three-bearing crankshaft is general practise. Governors are being more generally fitted, and are set to regulate crankshaft speeds between 850 and 1,000 r.p.m., according to the motor sizes.

Bore and stroke measurements are smaller than heretofore. The average bore in the show was 3.75 inches; the average stroke 5.3 inches, a clean-cut decision in favor of the long-stroke type of motor. The smallest motor shown in a truck was the DeDion four-cylinder block type, bore 2.5 inches, stroke 3.5 inches. The largest motor was the six-cylinder Halley, colonial type, with bore 5 inches and stroke 5.25 inches.

Wolseley Meets War Requirements

The Wolseley company always announces a program of design and manufacture which is followed with interest by the engineering world and at the recent show the company's new 3-ton truck designed especially to meet the requirements of the War Department was a chassis of special interest. The general features of this model appeared in last issue of THE AUTOMOBILE, page 227.

It is with the rear axle construction and chassis details that the greatest interest centers. Transmission of power, from the leather-faced cone clutch carried in the flywheel of the motor, is through a four-speed gearbox and thence through the propeller

shaft with a universal joint at each end to the double reduction rear axle. Figs. 1 and 5 show the general scheme of the axle in which the first reduction is from a bevel pinion on the short shaft forming a continuation of the propeller shaft to a larger bevel on a short transverse countershaft located slightly in advance of and slightly higher than the axle. From this countershaft a spur pinion transmits to a very wide spur gear on the axle. The countershaft carries the differential and to it are fitted spur gears driving the axle shafts. Gun metal with ball thrusts are used where necessary.

The entire axle housing is compact design permitting of good clearance and to it bolt the heavy pressed steel torque numbers, one at each side of the propeller shaft. These members converge as they extend forward and have a ball-and-socket support in two downwardly curved brackets. They carry, at this point, bushings with a grease cup.

In this double-reduction axle design the same attention to detail is shown which characterizes all Wolseley productions. Near inner ends the axle drive shaft are splined to carry the spur pinions and the inner ends of these shafts are reduced in diameter and hardened to care for end thrusts. At their outer ends these shafts are similarly splined where they take the driving clutch which transmits the power to the wheels.

The hub bearings are floating bushings running on the ends of the axle tubes. The axle shafts do not support any of the weight of the vehicle but drive through solid splines and may be withdrawn by removing the hub cap. When they are withdrawn and the cover on the rear side of the center portion of the axle removed the differential gear bearings can be loosened and the gear bodily removed. Further accessibility is had by undoing the rings of bolts on the other side of the center portion of the axle and removing the shaft off the spherical joint of the torque member, when the whole of the machinery comprising the axle may be removed without either dismantling the axle or jacking up the frame.

The torque member has a solid spherical joint at its forward end and lies horizontally at the same height from the ground as the axis of the back wheels so that all forward thrust of the vehicle is horizontal.

The rear wheels are 41 inches in diameter and take 5-inch dual tires. Grease cups are provided for the operation of both sets of brakes and a particularly large cup for the floating wheel bushing which is drilled radially in order to distribute the lubricant throughout the housing.

The same care that is shown in the manufacture and mounting of the axle drive shaft appears in the short shaft forming a continuation of the propeller shaft carrying the driving bevel pinion. This shaft is splined at its forward end where it takes the yoke for the rear universal. It is mounted on double bearings with a double ball thrust between them and external arrangements are made for the adjustment of the series in which these bearings are carried so that the relationship of the pinion to the bevel can be set as desired from the outside.

All parts of the axle construction are made adequately strong according to the requirements concerned. The axle drive shafts are 2 1-4 inches in diameter midway their ends which is reduced to 2 inches immediately before the splining at the outer ends begins, the short counter shaft is 2.5 inches in diameter; the pinion shaft varies from 1 3-4 to 2 1-8 inches; and the propeller shaft is 1 1-2 inches. The robustness of the torque members is noted in the illustration. They vary from 6 inches vertical height at the rear to 4 inches at the front where the support is.

Two independent sets of brakes are fitted, both adjustable by hand without the use of tools. The front axle is of I section with inverted jaw ends and the swivel irons, carried in gun metal bearings, are provided with ball thrusts. The universal worm-and-sector steering gear is adjustable and easily renewed. Separate grease cups are fitted on all wearing parts of the chassis.

Hillman's V-Type Truck Motor

Attention of European manufacturers to light-weight commercial vehicles has preceded that to low-powered passenger

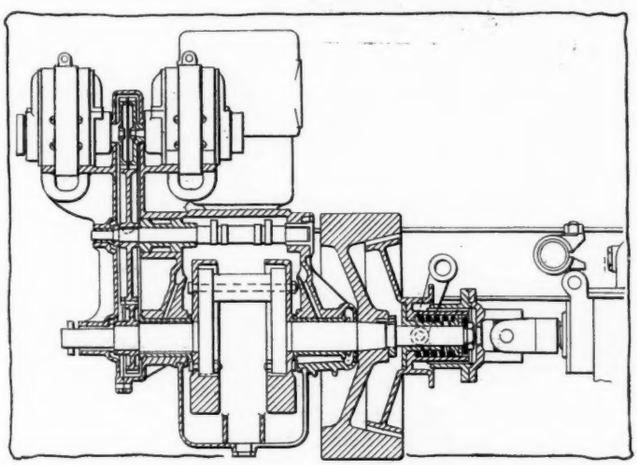


Fig. 4—Vertical section of Hillman two-cylinder V-type motor with its cylinders mounted at 60 degrees

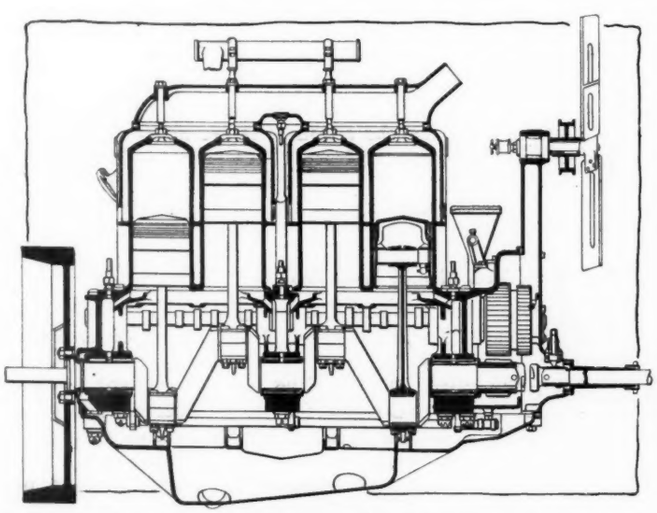


Fig. 3—Vertical section of four-cylinder Wolseley motor used in its latest truck design

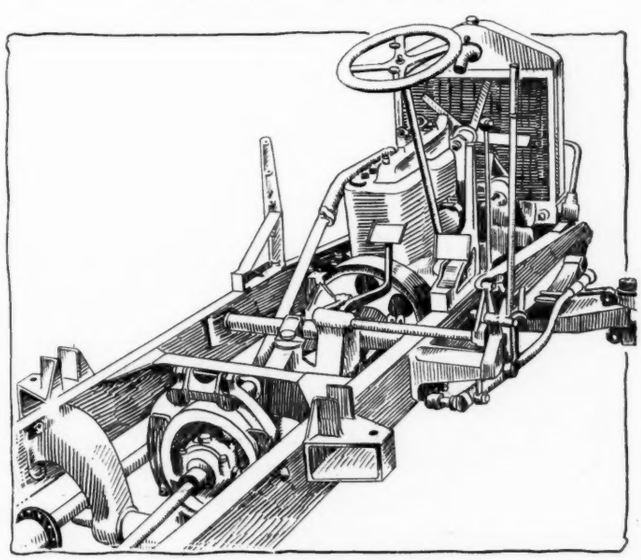


Fig. 5—General view of the rear end of Wolseley motor

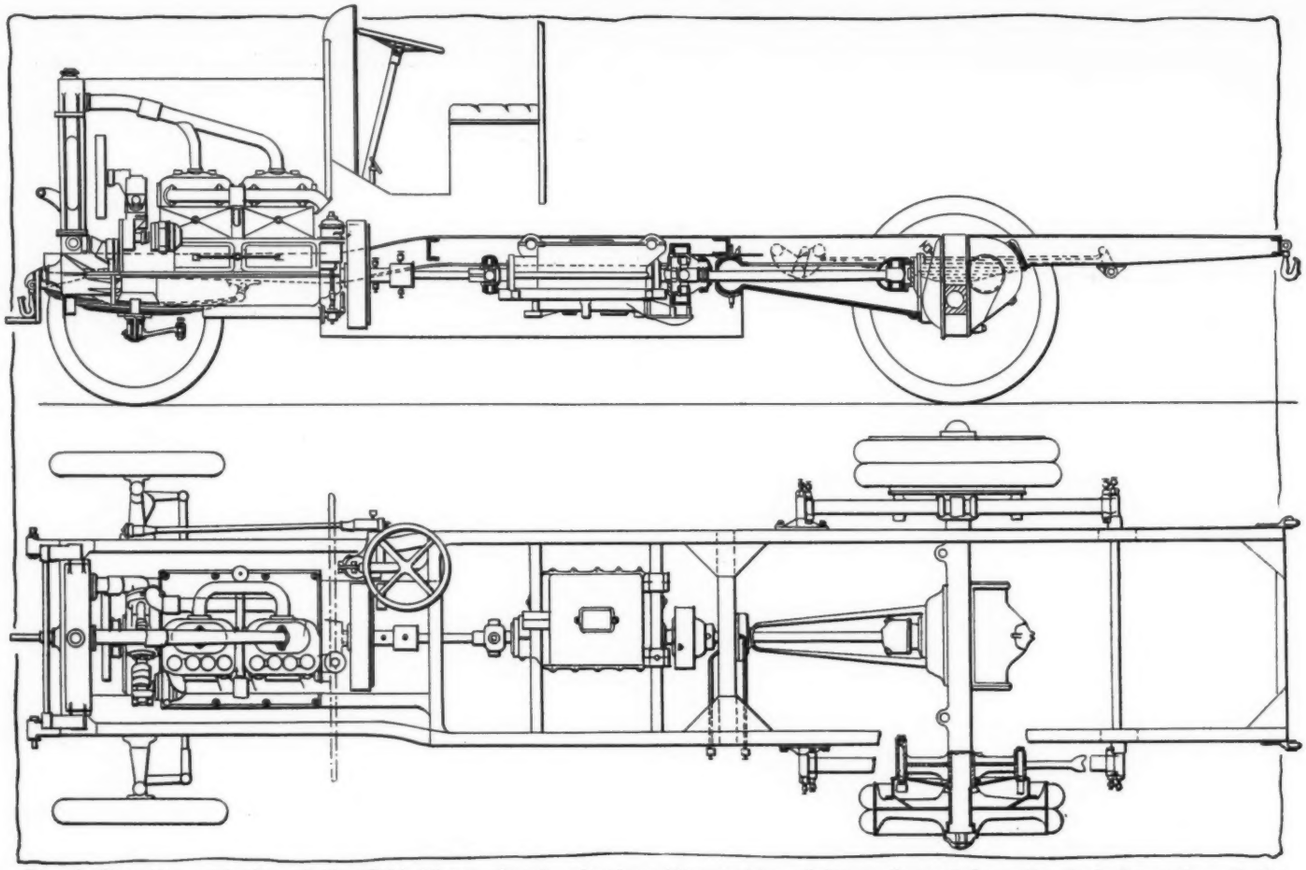


Fig. 6—Elevation and plan of Pagefield 4.5-ton chassis, showing side members of frame dropped from the dash forwards and also trough-like torque member

vehicles, and it is not surprising to see two-cylinder motors used in light delivery wagons of 1100 pounds capacity. An example of this is the Hillman which uses a two-cylinder V-type motor with the cylinders mounted at 60 degrees. The bore and stroke are 3.54 by 5.51, the company rating the motor at 10 horsepower. Power is transmitted from this motor through a cone clutch two-speed gearbox and thence by shaft to the rear axle where a reduction of 5 to 1 is given. These vehicles are made with a standard wheelbase of 90 inches which gives body accommodation 66 inches long and 42 inches wide. This is capable of handling any body type.

Pagefield's War Office Chassis

The Pagefield 4.5-ton War Office chassis shown in plan and elevation, Fig. 6, carries many of the earmarks required by the War Department. It uses a four-cylinder motor, 4.72 by 5.51 inches bore and stroke, and is adapted for either pump or thermo-syphon circulation. War Office specifications require the radiator to be mounted above the side member of the frame and in order to do this and yet not have the chassis undesirably high the frame members are dropped 3.5 inches in front.

Exceptionally large inspection plates are used on each side of the crankcase, large enough to permit of connecting rod adjustment. The magneto is mounted at an angle at the left front on a transverse shaft inclined at 30 degrees. It is driven by worm gearing and provisions are made for installing a second magneto or an electric lighting dynamo.

The transmission system from the gearbox is conventional excepting in that the combined torque and radius rod is in the form of an open trough semi-circular in cross section and mounted beneath the propeller shaft. As demanded by the War Office the rear axle is a double-reduction type with the differential mounted on the short transverse secondary shaft. The back axle is of floating construction, the rear wheels riding on extensions of the axle sleeves and transmitting to the wheels through clutches. Removing the hub cap permits of withdrawing the axle shaft.

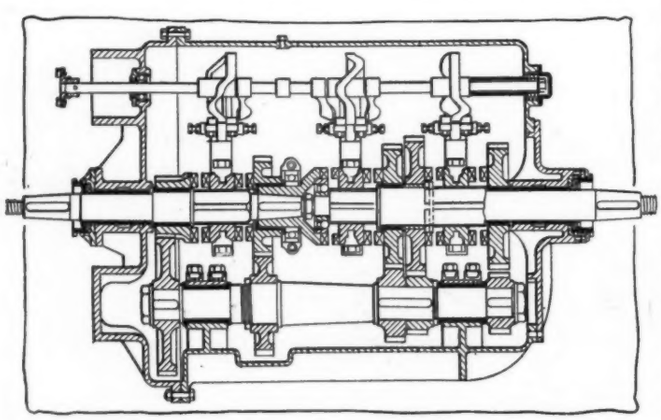


Fig. 7—Five-speed individual clutch type gearset for Commer 5-ton truck

Thornycroft Uses Pivoted Front Axle

The Thornycroft company has brought out a colonial type of truck intended for a 2.25-ton load and having as its equipment for this a 30-horsepower motor with cylinders cast in pairs, opposite valves and with the driver positioned in rear of the dash, passenger-car fashion. As in other colonial types the front axle is pivoted in the center and spring suspension is through an inverted semi-elliptic transverse member anchored below the radiator, Fig. 8, showing the general scheme of arrangement in this vehicle. This front axle scheme provides a three-suspension for the chassis which is considered desir-

able for the colonial field. The vehicle is fitted with large diameter steel wheels giving a ground clearance of 14 inches, the back wheels being provided with slots to take cross strips for use in soft places.

The chassis design of this vehicle is much more conventional, apart from front axle, than that of other colonial types. The power is transmitted from the flywheel clutch through the propeller shaft to the unit gearbox and jackshaft located slightly in advance at the rear axle giving a reasonably short chain transmission. Chain cases are used. The truck is fitted with steering wheel on the right side and right-hand levers.

Commer Has Five-Speed Gearset

The Commer trucks have for several years been characterized by a unique gearset in which the gears are always in mesh and in which they are locked to their respective shafts by individual clutches controlled through a cam movement, so that the shifting lever can be set in position for a certain gear and when the engine speed or the car speed reaches that position the gear automatically engages. This concern has recently added a 40-horsepower, four-cylinder, 5-ton model in which a five-speed gearbox is used. Fig. 7 shows the general layout of this gear set with the three individual clutches located between sets of gears on the mainshaft. In the side of the case is the rod with the cam mechanism which accomplishes the semi-automatic gear shifting. Another feature of this truck is the duplicate ignition system, the magneto having a double contact maker, one serving for the magneto current and the other for current from the battery and coil system.

Pedrail in Improved Form

The Pedrail which made its appearance several years ago and which since then has had a limited use for the transporting of heavy road and ditchmaking machinery as well as for heavy vehicle use has been considerably improved and many of its shortcomings eliminated by the use of an anti-friction spring roller chain which has eliminated much of the friction which robbed the previous types of their efficiency.

In the revamped Pedrail instead of wheels carrying the vehicle there is on each side a continuous chain carrying a large number of articulated feet which bear upon the road surface and carry the vehicle ahead. Fig. 9, an elevation of the Pedrail, shows four of the flat feet, in respective positions when the vehicle is in motion, the lower one taking the load while another is shown a foot from the ground in a horizontal position but yet not actually in contact. A third is shown vertically at the forward end and another horizontally as it rides from rear to front at the top.

The operation of the chain carrying these traveling feet is built around a frame work which is enveloped by a steel rail upon which travels the inner anti-friction chain. This chain consist of three lines of rollers connected by springs, those

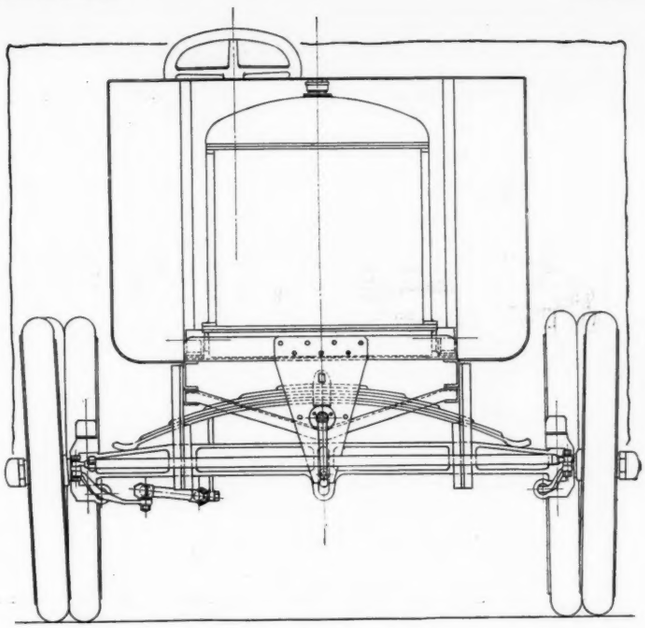


Fig. 8—Pivoted front axle with transverse springs on Thornycroft 2.25-ton Colonial chassis

running in the center being vertical, whereas the rollers in the two side lines are placed alternately horizontal and vertical. The horizontal rollers are to prevent side motion and flange friction, whereas the vertical rollers give to the main slipper H a bearing upon from 6 to 8 lines of contact according to position. The foot carrier is mounted on the main slipper and has two projecting arms to which are attached the suspension slippers, the arms being on opposite sides of the carrier and the slippers engaging each of the two parallel suspension chains. The articulated ankle movement is accomplished in the lower part of the carrier and consists of a ball-and-socket motion and a spiral string to bring the foot back to its normal position after it has been deflected. In each carrier there are also two vertical compressed springs which take the load vertically and the force exerted by them can be varied to suit conditions.

At the forward end of the pedrail or large specially designed sprocket wheels and to the shaft of these wheels are attached the brakes. At the opposite end of the Pedrail is a similar pair of sprockets which are driven by the gasoline motor and which impart through the feet the entire driving force.

When steering is necessary a cast steel frame work carrying a worm attached to the front of the vehicle is used. This worm engages a worm wheel sector on the rear which enables steering to be effected in rudder fashion.

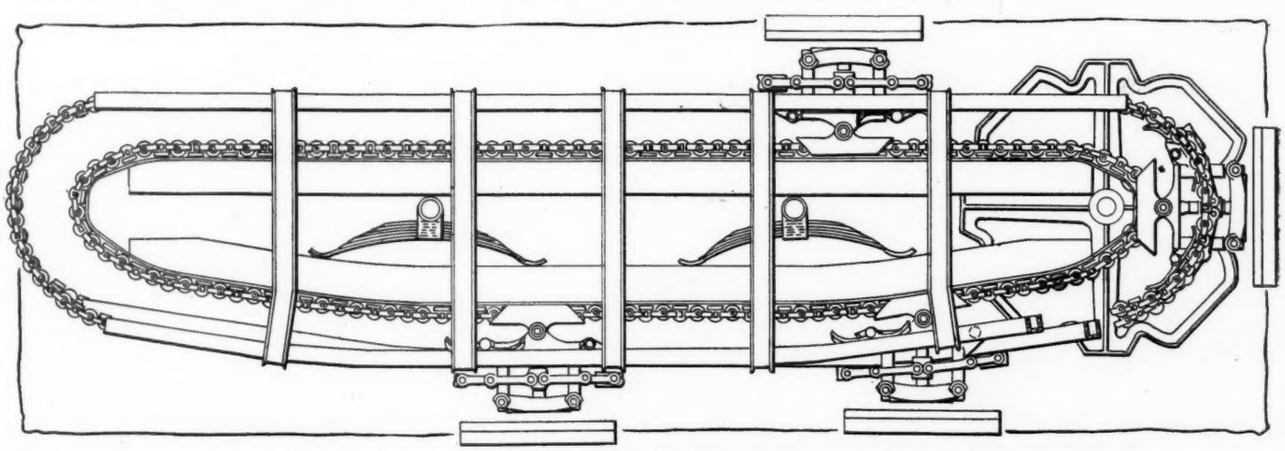


Fig. 9—The revamped Pedrail, showing four of the feet in different positions in their circuit

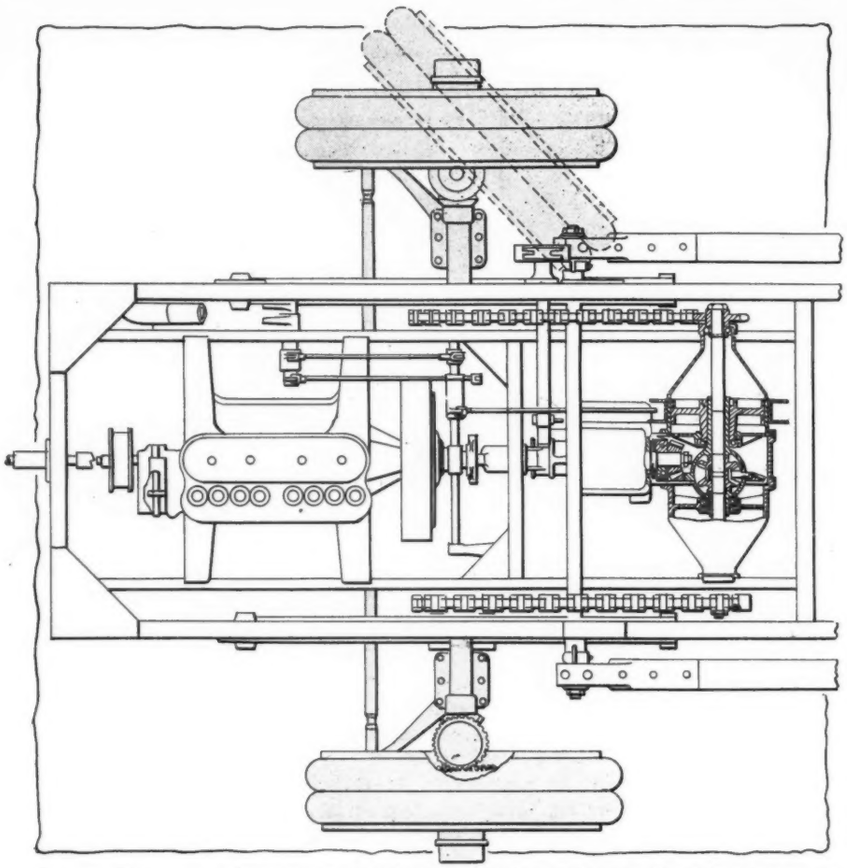


Fig. 10—Plan view of Mass front-drive tractor, showing motor and clutch in advance of axle and gearset and jackshaft in rear of axle

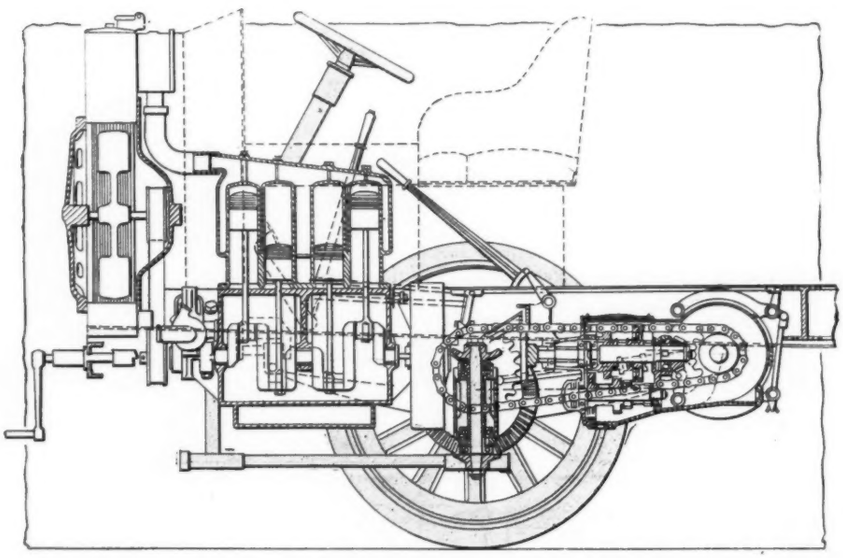


Fig. 11—Vertical section of Mass tractor, showing copious water-jacketing spaces and Solex radiator

Mass Front-Drive Vehicle

The spirit of the front-wheel tractor is gaining and the demonstrations of the Mass tractor made in 3 and 6-ton capacities have shown that a 12 to 16-horsepower motor, 3.34-inch bore and 5.51-inch stroke, will pull an effective 2.5-ton load up a 25 per cent. grade at 4 miles per hour. In addition to the tractive qualities of the front-wheel-drive vehicle there is the added merit of a particularly low platform for carrying the load in that the top of the chassis is only 2 feet from the ground.

In most respects the Mass front-wheel-drive chassis resembles the conventional one. Fig. 10 shows a plan view with a four-cylinder motor as well as the cone clutch mounted in advance of the axle and with the combined gearbox, differential and jackshaft in rear of the axle. The jackshaft is short carrying sprockets which are inside of the side members of the frame. From these sprockets driving chains extend forward to sprockets mounted directly above the front axle. The method of drive from these sprockets are best illustrated in Fig. 12. On the inner end of each shaft carrying the sprocket is a bevel pinion. In the hollow steering pin is a vertical shaft with two bevel pinions, one at the top the other at the bottom. The top one takes the drive from the sprocket shaft. The bottom one drives into a large bevel on the front wheel. This is the system complete. These bevels are entirely inclosed so as to be well protected from dirt.

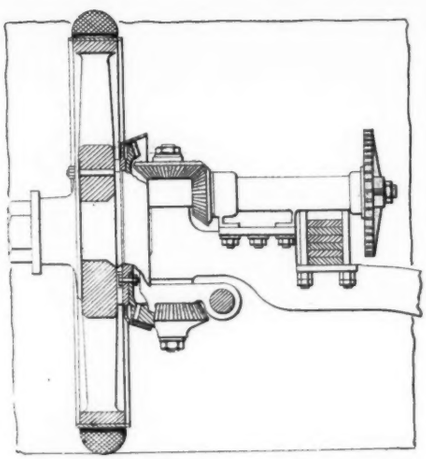


Fig. 12—Vertical section through front wheel of Mass tractor, showing method of driving from sprocket through two sets of bevel gears to the front wheel

The Mass tractor is constructed in accordance with the Bezacon patents.

The motor used is a four-cylinder block type with particularly ample jacket spaces surrounding the cylinders and a specially copious jacket header which connects through large pipings with a Solex radiator mounted forward of the engine. This radiator, as previously described in THE AUTOMOBILE, consists of a series of concentric copper tubes with the cooling fan mounted in the center.

Halley's Colonial Truck

A characteristic of the recent show was the number of colonial type trucks exhibited, these being primarily intended for colonies embracing Canada, South Africa, Australia and the South American possessions. Invariably these vehicles are made much heavier than those intended for European use and with more powerful motors. A typical example of this type of vehicle is the 8-ton Halley truck fitted with an abnormally large six-cylinder motor, 5-inch bore and 5¼-inch stroke rated officially at 60 horsepower. The engine is designed so that it can be driven either on gasoline or paraffin.

As Fig. 13 shows, the chassis is a conventional design, the drive from the motor

going through a four-speed gearset, but instead of the drive chains transmitting the power direct from the countershaft to the wheels they deliver it through planetary gears which gears rotate winding drums situated outside of the road wheels, these drums being conspicuous in the rear view, Fig. 15. When removable pins are inserted these drums revolve with the wheels but in removing the pins the drums rotate but the wheels remain idle, the object being that the drums may be used to extricate the vehicle from bad road conditions and during which time the rear wheels simply act as rotary members the same as the forward ones. The driving chains are entirely inclosed.

Fig. 14, the front view of the Halley truck, shows that the axle is pivoted about a pin attached to a cross member of the frame. Directly above the axle is a cross spring which bears at each end upon the axle. Pivoting the axle in the center and using this spring allows of a wide range of up-and-down movement at either end of the axle without interfering with the level of the frame. Although this construction gives a wide range of flexibility which is possible with a slow-moving vehicle of this type it would be impractical with lighter-load and higher-speed vehicles.

The driving wheels are 5 feet in diameter and 18 inches wide, and the front wheels, 3 feet 10 inches in diameter, have a 9-inch width. All four wheels are steel shod with diagonal bars to prevent slipping sideways.

Other features of this Colonial vehicle which fits it for rough colonial use are double-sized fuel tank in the rear, emergency water tank under the seat which may be used to supply the engine if necessary and heavy brake shoes acting on the rear wheel tires.

Some conception of this truck may be gained from the fact that its overall length is 24 feet 8 inches and the chassis weight 6 tons. In addition to its own weight it is capable of taking a 6-ton load and drawing a 2-ton trailer load. It has a minimum ground clearance of 18 inches under the chain cases and 27 inches under the rear axle and all of the motor mechanisms. In rear of the driver's seat the load platform measures 14 feet in length and 7 feet 6 inches in width. In spite of these enoromus dimensions the vehicle has a rated speed of 9 miles per hour, at which rate the motor governor is regulating the crankshaft speed at 1000 revolutions per minute. The four-speed gearbox is an individual clutch design. In this truck a careful selection of metals has been made. Both axles are of nickel steel and alloy steel enters into many parts of the truck.

The plan view of the Halley Colonial truck shown in Fig. 13 gives an idea of the disposition of the motor and drive unit and also shows a plan of the position of the winding drums on the hubs of the rear wheels. The divided water manifold is shown and also at the forward end the arrangement of the steering connection.

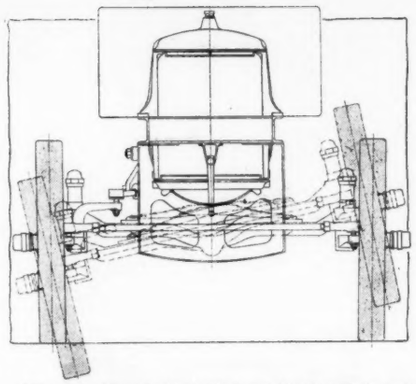


Fig. 14—Front elevation of Halley Colonial truck, showing range of action of pivoted front axle

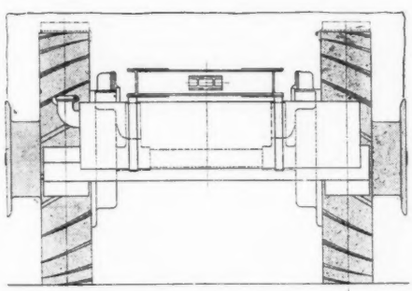


Fig. 15—Rear view of Halley Colonial truck, showing position of winding drums on hubs of rear wheels

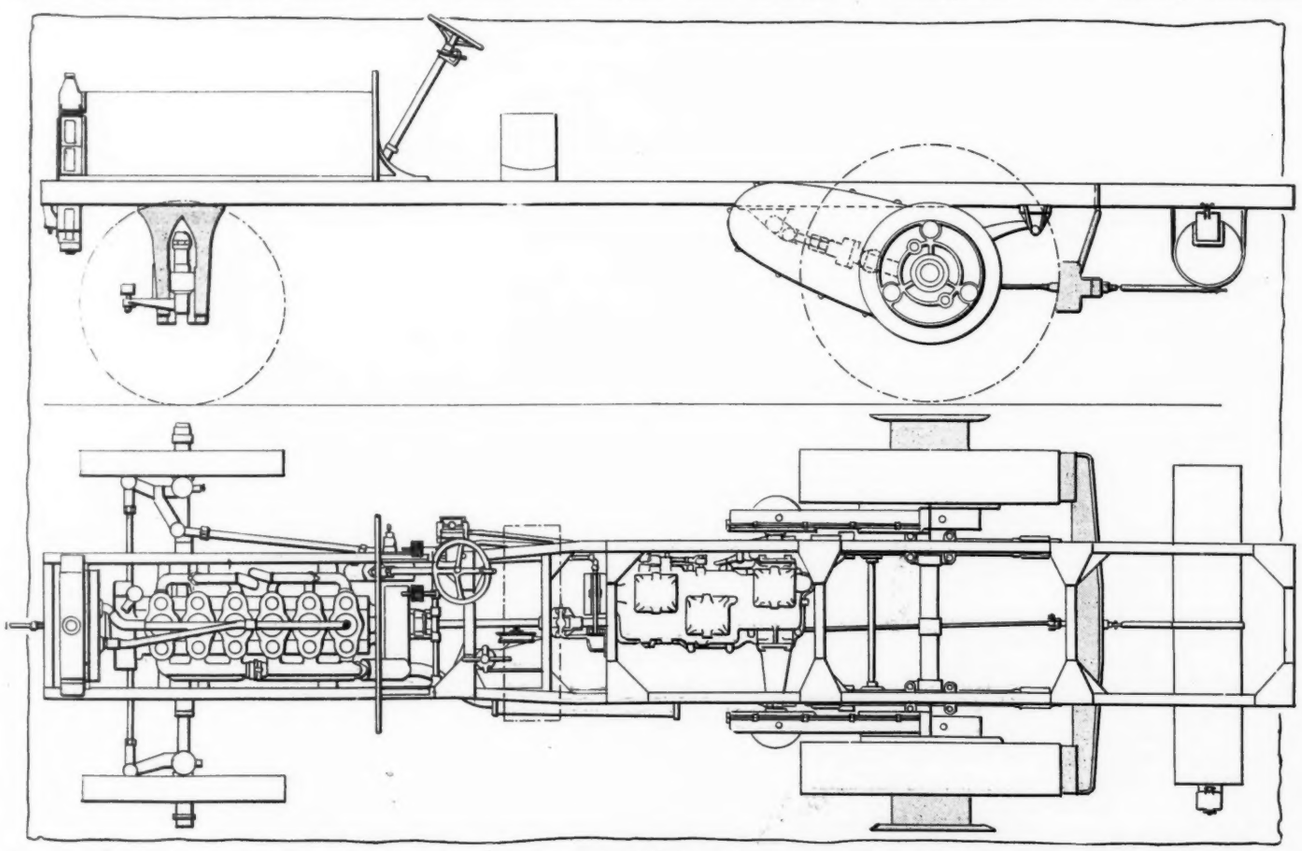


Fig. 13—Elevation and plan of Halley's Colonial truck, characterized by six-cylinder motor, steel shod wheel and pivoted front axle with transverse spring

Five-Job Municipal Vehicle

I—Sprinkles the street
II—Sweeps the street
III—Scours the street
IV—Fights fires
V—Takes a dumping body and is used in the removal of garbage

Germans Are Leaders in Solving Municipal Vehicle Problem

BERLIN, August 1—Much versatility has been shown in the design of vehicles for municipal use, one of the latest trends in this respect being the combination chassis, which can be used for different municipal purposes, such as street sweeping, street sprinkling and garbage removal, one of the latest productions of this kind being brought out by the Bez-Werke, of Gaggenau, which is designed for any water tank capacity the normal size being 3,000 to 5,000 liters or 800 to 1,200 gallons.

A characteristic of the chassis of these vehicles is that they are identical with those chassis used for merchandise transport work, the sentiment gaining ground in this country, namely, that it is poor business and production policy to build special chassis to meet the whims of individual municipalities.

In all of these municipal vehicles a special multiple-jet carbureter is needed which will use either light or heavy oils or gasoline. The carbureter is generally set to be capable of using benzol with a density of .760. The carbureter must further meet the requirements of economic operation and operating equally well under differences of climate.

The standard chassis incorporates a four-cylinder motor, multiple-disk clutch, four-speed gearbox and final drive by chains. Cast steel road wheels are used.

The sprinkling arrangements are as follows: The elongated rectangular water of oval cross section has any volume desired, the determination of its capacity being according to the load capacity of the chassis. With 3,000 liters capacity the length is 3,500 milimeters, width, 1,400 milimeters, and height 800 milimeters. In English equivalents these dimensions are, capacity, 792.50 gallons, length 140 inches, width 56 inches, height 32 inches.

Fig. 1—Benz-Gaggenau truck used as street sprinkler

Other tanks with 4,000 liters capacity have the same length, but the width slightly greater, 1,500 milimeters, and the height a little more, namely, 880 milimeters. In English equivalents these are, capacity 1,056.7 gallons, length 140 inches, width 60 inches, height 35 1-5 inches.

The largest capacity tank, 5,000 liters,

has the same length as the others and the width of 1,500 milimeters and the height of 1,070 milimeters, the additional capacity being obtained by the greater height. In English equivalents these are, capacity 1,320.8 gallons, length 140 inches, width 60 inches, height 42 4-5 inches.

Fig. 2—Use of the truck for scouring the city streets

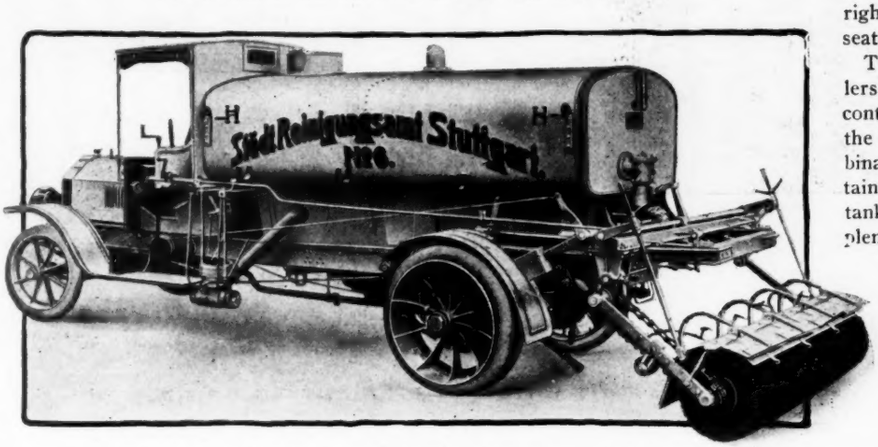


Fig. 3—Sweeping the streets is also part of the truck's work

The tanks comprise in their interior arrangements a series of transverse baffle plates to prevent splashing of the water. The manhole at the top of the tank, Fig. 1 is designed to be locked, and an overflow tube discharges automatically any surplus water. In the back part of the tank there is a looking hole, and farther down an ordinary filling and discharging cock, which allows the tank to be replenished by connecting it to a hydrant. Two Hooks, H, Fig. 1, fitted at each side of the tank allow this to be readily lifted from the chassis when the car is to be used for other purposes.

The sprinkling device is arranged either in front—below the driver's seat—or at the back, and consists of two-valve cylinder sprinklers comprising three adjustments for small, medium and strong effects, and a sprinkler arranged at the back which always works without the pump and just covers the width of the chassis, the main sprinklers projecting their spray sideways and not below the car.

The width of sprinkling is controlled by a throttling valve which is opened or closed from the driver's seat. Another means of adjusting the width of sprinkling is by shifting a metal slide outside the spray cylinders, which is controlled from the driver's seat by means of a lever, and when working without the pump allows the range of the sprinklers to be adjusted between 2 and 8 meters and when working with the pump, between 2 and 10-12 or 2 and 20-25 meters. This regulation is instantaneous and extremely accurate. A meter is 39.4 inches.

When working without the pump, all that is required for starting the sprinklers is to open the front throttling valve. When pressure is to be applied the rotary pump is set working by throwing in the pinion drive by means of the lever to the right of the driver's seat.

The several sprinklers are entirely self-contained and allow the most varied combinations to be obtained. The water tank can also be replenished from a river, lake or the like, by means of the pump, which then acts as suction pump. To this effect there is provided a throttling valve and a fitting on which a suction hose is applied whenever it is desired to use such a device.

The sprinkler car can be combined with a brushing, washing and scrubbing machine. This arrangement is placed at the back and consists of a removable iron frame fitted to the sprinkler body and above which a rotary frame is arranged. Below this frame is suspended the brushing and scouring drum which is operated directly from the car motor, being started and stopped, lifted and lowered from the driver's seat.

It takes about one-half hour to exchange the rotary rubber brush for the broom type brush. This exchange is accomplished by loosening the brush shaft bearing, opposite the brush chain drive, when the brush is readily withdrawn.

When the car is to be used for brushing the brush drum is fitted and adjusted for right-hand or left-hand operation, as the case may be, thus allowing the brushing to be commenced from any point of the street. Only the back sprinkler is then operated, the diameter of perforations being chosen in accordance with actual weather and road conditions. When used for cleaning

(*Continued on page 278*)

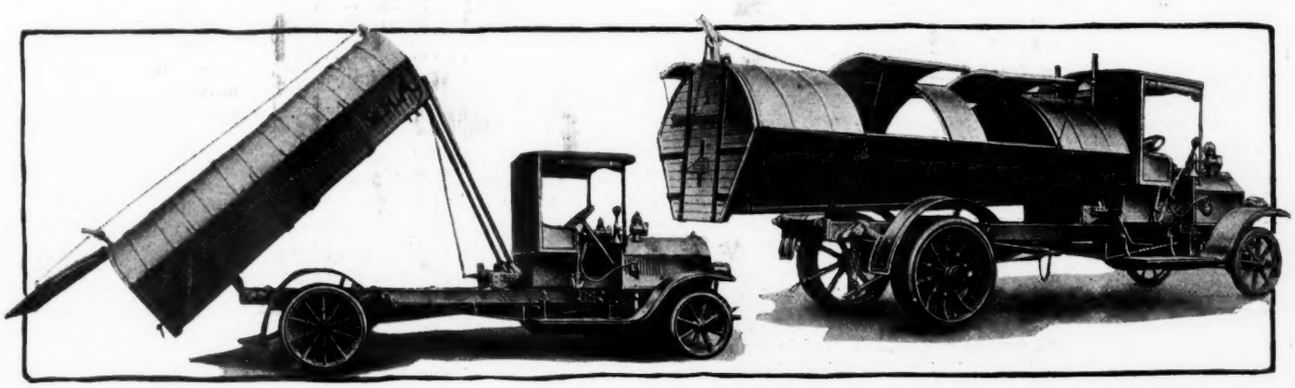
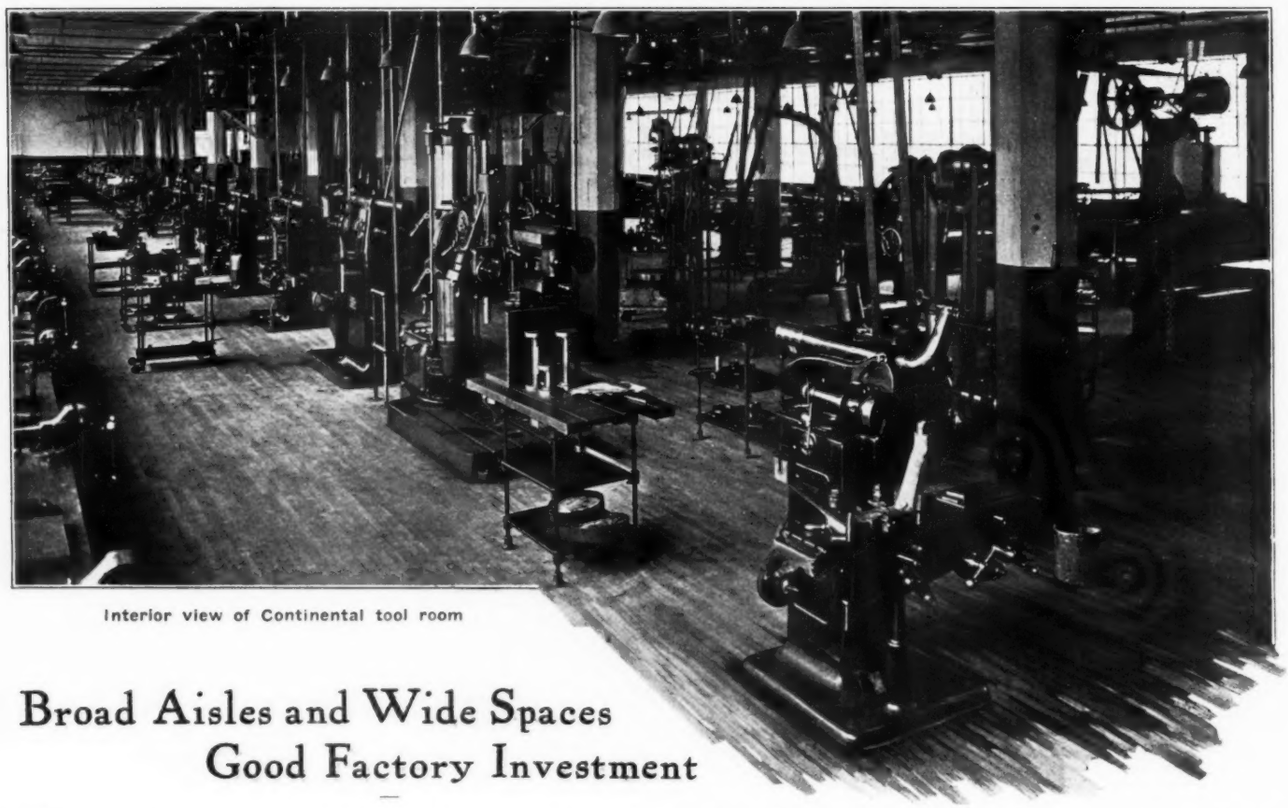


Fig. 4—A specially constructed dumping body permits of the truck's application to the work of removing garbage to its dumping place



Interior view of Continental tool room

Broad Aisles and Wide Spaces Good Factory Investment

THE Continental Motors Mfg. Co., takes care of its tools in a room having an aggregate area of 11,000 square feet of floor space. The room contains more than fifty machines which are especially designed for tool work and which are large enough in capacity to handle jigs and fixtures up to 1 ton in weight.

Big boring mills, fully universal radial drills, a huge duplex milling machine and many others make the equipment complete for every type of work.

Seventy-five tool makers—high priced master mechanics—are kept busy supplying the Detroit plant with jigs and fixtures of extreme accuracy. In addition, the Continental Company have another completely equipped tool department at their Muskegon plant. The broad aisles, big windows and large inter-machinery spaces insure good workmanship.

Five-Job Municipal Vehicle

(*Continued from page 277*)

asphalt streets the brush drum can be combined wtih a resilient scrubbing device. For washing asphalt streets the brush drum is replaced by an india-rubber scouring drum. Though only the back sprinkler is used in this connection, the main sprinkler can be set working for soaking the road surface.

The number of turns of the brushes is independent of the speed of the vehicle, being about 46 and 70 per minute for the rubber and broom type brushes respectively.

According to the actual condition of the road, the vehicle travels at a speed of 6 or 4 miles per hour.

By fitting a special screw connection for a length of hose, the sprinkler car can be converted into a fire-engine, its rotary pump supplying about 900 litres per minute under a suction head of 26 feet and yielding a substantial water jet about 47 feet high with a tube .5 inch in diameter.

A suitable arrangement for using the car for simultaneous sprinkling and brushing consists of attaching one or two brushing machines. It will be found extremely convenient for washing streets and squares by means of a length of pump hose fitted to the car. In the case of floods it will be used as rescue car for emptying flooded rooms.

Since provision is made for removing the tank after loosening a few screws, there is a possibility of employing the sprinkler car as load van for the transport of material as used in municipal work. The vehicles recently supplied to the City of Stuttgart at the same time serve as refuse cars and to this effect are fitted with a tipping body which allows the contents to be emptied rapidly and without raising any dust. The interchange of the watertank and garbage bodies takes about .5 hours—or more or less, according to the skill of the men and the available lifting appliances, jacks, etc.

The whole sweeping or washing arrangements are as well designed to be dismounted in about 1.5 hours.

According to statements by the Stuttgart municipality, the daily expense of operating a motor-driven sprinkler of this type work out ta about $14, of which there corresponds to

1. Gasoline consumption	$2.60
2. Rubber tires	2.35
3. Lubricating oil and rags	.47
4. Attendance	2.11
5. Interest	1.22
6. Depreciation at 10 per cent	3.76
7. Upkeep and insurance	1.20
	$13.71
or, as the figures are approximate, about	14.00

In the above it has been assumed that the car is used for sprinkling on 150 days of the year, the whole of the interest being during this time, used up as redemption, the purchasing price of the vehicle being taken at about $5,640. Water expenses are not allowed for, the motor with the suction and pressure pump being designed to derive the water directly from any water course. According to actual experience at Stuttgart, a motor-driven sprinkler of 5 cubic meters capacity will replace four horse-driven sprinklers each of 2.4 cubic meters useful capacity.

Mills On All Three Sides

Stearns-Knight Crankcases Milled and Drilled in Rapid Succession

THE Stearns-Knight crankcase has to be milled on three sides. This would be a slow job were the manufacturer compelled to put the crankcase into a separate jig and into a separate machine for one side at a time.

Instead of doing this a special machine is used in the Stearns plant with which the crankcase can be machined on all three sides at the same time and at one operation.

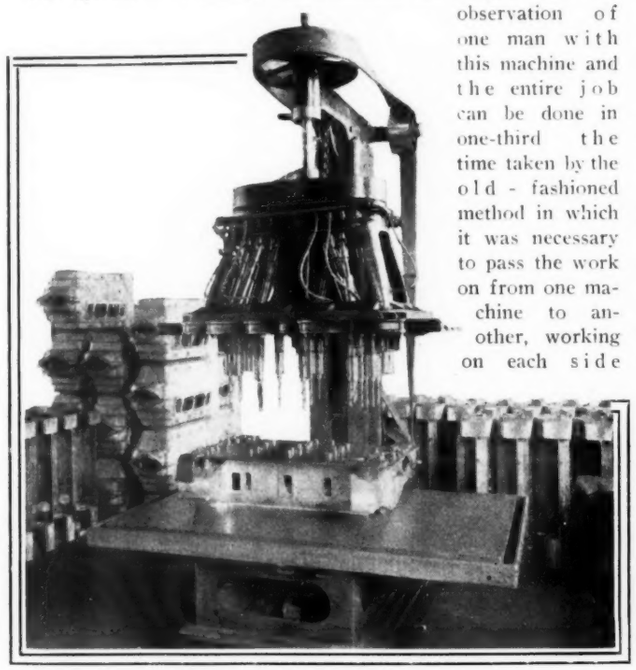
The illustration at the top of this page shows the machine that does the work. It is a product of the Ingersoll Milling Machine Company, Rockford, Ill., and has been designed for the requirements of the milling operations on the Stearns-Knight crankcases.

There are three cutters in operation at the same time. The crankcase moves along the bedplate as it is fed to the machine and the cutters come into action independently, each doing its work as the part to be milled reaches it. The cutter working on the top of the crankcase finishes the entire surface, all the parts to be milled being in the same plane and hence requiring but one cutting.

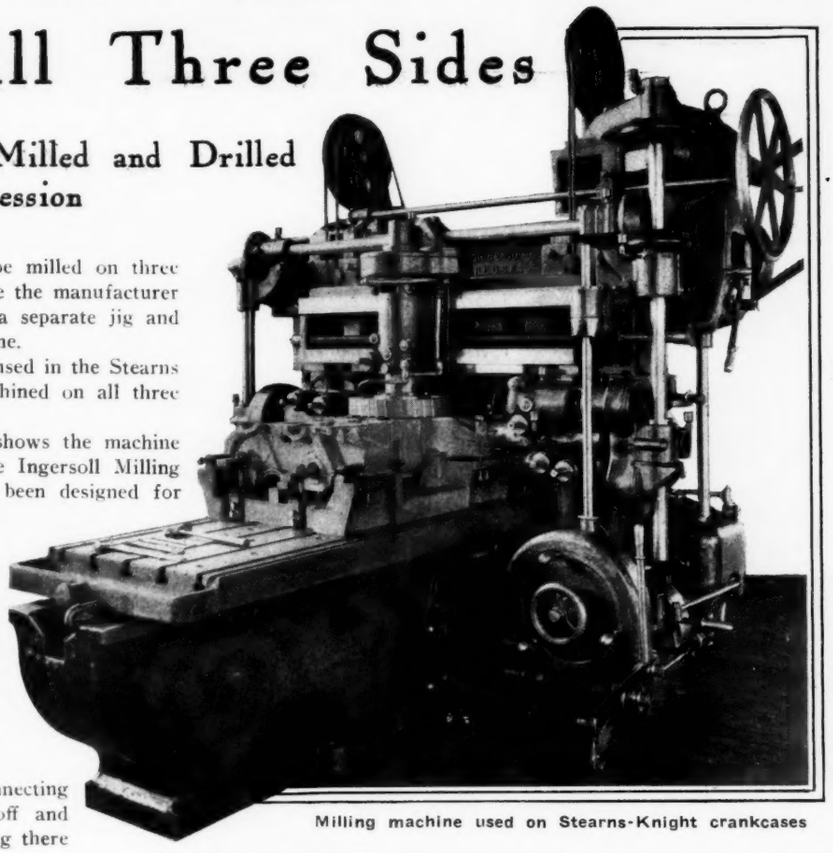
On the sides of the case the arms for connecting the crankcase to the chassis are planed off and brought to accurate size so that in assembling there is no more machine fitting to be done.

The operation of putting the crankcase into the jig is a matter of 3 minutes. It is held in place by slots in the bedplate and the crankcase is fastened to the jig by quickly removable dogs at the ends. The fastening may be noted in the illustration on the side toward the observer. The dog is passed through the eccentric shaft opening and a through bolt holds the crankcase in place on the jig.

The operation of milling the crankcase can be put under the observation of one man with this machine and the entire job can be done in one-third the time taken by the old-fashioned method in which it was necessary to pass the work on from one machine to another, working on each side successively. The space taken in the factory is less with this method and the cost is deeply cut by the use of the machine.



Multiple spindle drill for Stearns crankcase work



Milling machine used on Stearns-Knight crankcases

The action of the machine is semi-automatic. The only work necessary on the part of the machinist after the crankcase has been set in the jig is to start the machine. The adjustments once made are held without change and the attention required by the machine itself is all within the scope of the operator.

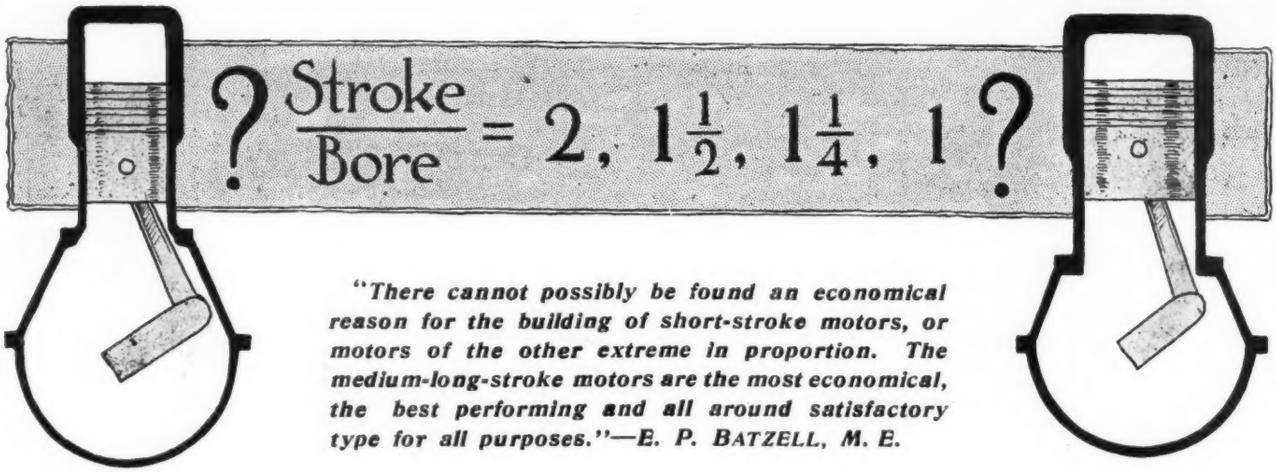
The operating mechanism of the machine may be seen on the right side of the illustration, and is shown to include a set of change speed gears, micrometer adjustments and starting and stopping devices. A set of extra milling cutters is kept hanging on the wall in close proximity to the machine should they be required. Another operation necessary in the crankcase work which can take a longer time than necessary if the machine tools used are not up-to-date is the drilling.

The illustration at the foot of the page shows a machine furnished the Stearns company by the Baush Machine Tool Co. of Springfield, Mass. In the illustration the horizontal face of the crankcase is being drilled. The jig is shown in position with the drills lifted off the work.

In the background the crankcases may be observed in two stacks, one for the unfinished and the other for the finished ones.

The aluminum crankcases are light and it would be easy for one man to swing the work into place on the jig. The machine takes up little room, and this, taken into consideration with its fast work, gives an efficient tool.

In the factory the machines are arranged in the progressive method. The work passes from tool to tool and does not double on its route through the various stages that transform it from a piece of rough stock to the finished part. Each man is a specialist on his own machine and there is no changing of men from machine to machine in following the work through. The plan used is that the men remain stationary and the work travels. Where the men travel from job to job time is lost and it is impossible for the department heads to keep in accurate touch with the location of the men and at the same time to check the progress of the work.



"There cannot possibly be found an economical reason for the building of short-stroke motors, or motors of the other extreme in proportion. The medium-long-stroke motors are the most economical, the best performing and all around satisfactory type for all purposes."—E. P. BATZELL, M. E.

The Most Efficient Stroke-Bore Ratio

Compares Power Losses in Two Motor Types

Piston Rings Use Little Power
Cooling and Ignition Devices Consume the Same Amount of Driving Power

By E. P. Batzell, M. E.—Part II

(*Continued from page 231*).

LAST week Mr. Batzell introduced the subject of stroke-bore ratio by concisely mentioning the leading features to be discussed. The first point made by the author was the increase in mechanical efficiency due to a longer stroke. This week he points out the difference in the valve action, cooling, etc.

In the case of the selected example this product is alike for both motors, thus equaling the latter in respect to their losses in piston friction. The actual amount of power lost in this instance is quite small due to the small acting side thrust forces. This thrust amounts to practically nothing during the periods of the intake and exhaust, and it attains its maximum near the moment of greatest connecting rod angularity with the cylinder axis in the expansion stroke. At this moment the pressure inside the cylinder is considerably lower than at the time of the explosion, and the greatest side thrust in the average motors does not surpass one-fifth of this piston pressure at the moment of greatest connecting rod angularity.

Similarly, **the friction of the piston rings results in but slight losses of power, when the rings are properly worked in.** The motor of 3.57 inch bore in average practice would carry three or four piston rings, each 3/16 to ¼ inch wide, and the piston for the 4½ inch bore motor would have four rings each ¼ inch wide. The piston rings are generally fitted so, that they exert an almost uniform pressure upon the cylinder walls, this pressure being about 4 to 5 pounds per square inch of their surface. Thus the total ring pressure of the small-bore motor may amount to about $3.57 \times \text{II} \times 4 \times 3/16 \times 5 = 42$ pounds; and that of the large one, to $4.5 \times \text{II} \times 4 \times ¼ \times 5 = 70$ pounds. This with a friction coefficient of .08 between the rings and the cylinder walls would result in a loss of motor power at 1,000 r.p.m. equaling about .12 horsepower for the long stroke and .13 horsepower for the square motors. The available difference of .01 horsepowers favors the former type, but it is so slight, that it should be entirely overlooked in practice, thus equaling both motors also in regard to the piston-ring friction losses.

That part of the motor power which is used towards driving the regular motor accessories, the cooling, ignition, etc., apparatus, could be logically considered as being the same in the case of either the long or short-stroke motors, leaving for further comparison of their relative merits merely the losses in the drive of the valve mechanism.

It remains questionable whether or not it is proper to assume equal power losses due to the cooling means of the motors, because as will be explained further on, the long-stroke motor could afford a somewhat less intense cooling, than the square type. The possible difference in this power loss being but very slight and besides, inasmuch as the thermo-syphon system of cooling does away entirely with the water pump, one will remain close to the actual state of things by not making any discrimination of the two motor types in regard to this source of power loss.

The valve operating losses also could be alike in both motors, if for the sake of making things equal one will suppose the motors equipped with valves of the same diameter and lift. This would require in each case the same effort to lift the valves against the action of the valve spring and the pressure inside the cylinder acting upon the valve head. The fact that the total weight of the valve parts might be somewhat greater in the long-stroke motor on account of its greater height, should be left out of consideration in the matter of work gone towards the operation of the valves, again because the possible difference would be very small in comparison with the other acting forces, which should be overcome by the valve-lifting cam.

In actual practice the constructive features to be met with in the discussed types of motors would render it preferable in the long-stroke motor to use valves of a somewhat smaller diameter and with a higher lift, than in the square type. Large size valves of medium lift would be preferable for the latter. One could obtain valve openings in both motors of practically equal efficiency in respect to the possible volumetric cylinder filling at high speed, although the character of the valve openings would be different.

As a rough approximation, within certain limits, the product of the valve diameter on its lift should be alike for both motors, to make them equally efficient in their volumetric filling, at the fulfilling of which condition the motors becomes comparable under the aims of this article. The desirable effort of a valve spring generally can be expressed by an equation of the type

$$f = \frac{W \times j}{g}$$

where W is the weight of the reciprocating valve mechanism parts.

"j" is their acceleration.

"g" is the gravity acceleration, known to be a constant.

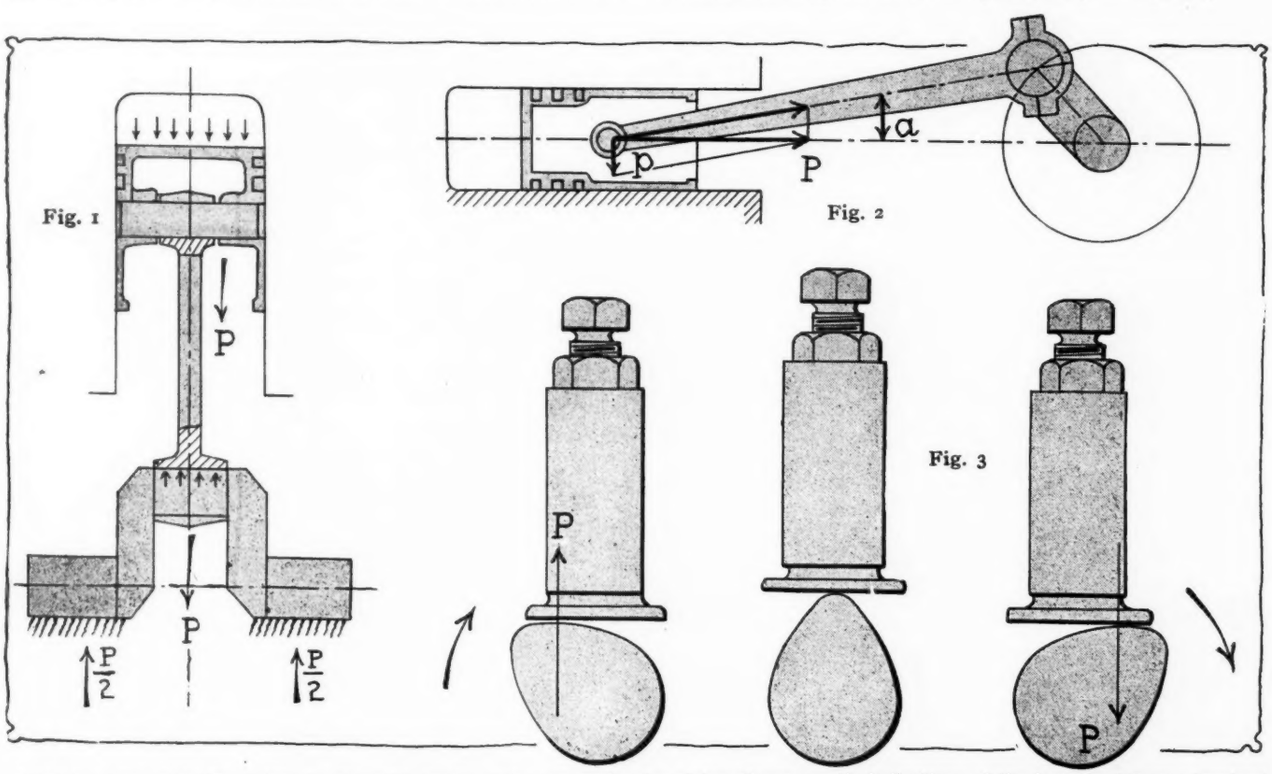
The weight of the valve mechanism parts is increasing with the valve diameter and with the motor stroke, but it remains more or less unaffected by the valve lift. On the other hand the latter influences the acceleration "j", which should be about proportional to the lift.

If there exists no difference in the weight of the valve parts of both motors one would have to provide valve springs of equal strength for them. Or, one would have to use stronger springs in the long-stroke motor to retain the same degree of quietness with its higher valve lift. But this fact should not increase much the total of the power required for driving the valve mechanism. If it takes more power to lift a valve against a stronger spring, at the same time this stronger spring delivers almost thus much more effort upon the camshaft in the direction of its rotation assisting the latter, after the apex of the cam has passed the center of the valvet tappet, provided the lifting cam and the centerline of the tappet are in line at the moment of maximum valve lift, Fig. 3. Therefore the question of power loss in this mechanism can be settled so, that the effort to lift the larger exhaust valve in the square motor against the pressure inside the cylinder is absorbing more power, than the higher valve lifting in the long stroke motor. Considering also the elapsing of the cylinder pressure, etc., one would come to the conclusion, that the results of the power losses created through the valve mechanism are practically alike in the motors regardless of their stroke to bore ratio. The possible difference in this instance again is not great enough to warrant its accounting for in the comparison of the motor types.

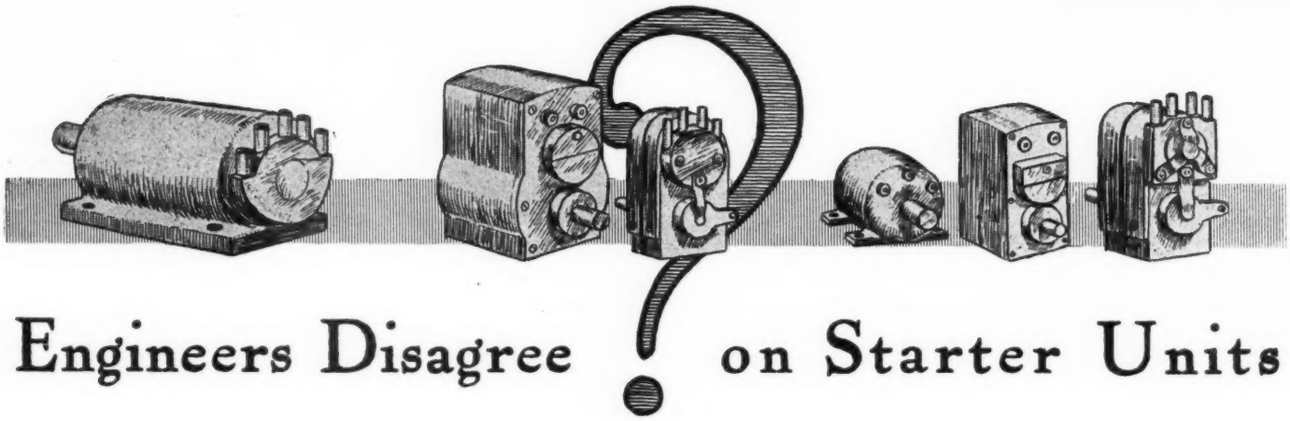
The above considerations covering the different mechanical losses in the short and long-stroke motors renders it plain that the latter is much better and can be much more efficient even almost solely due to the much smaller friction losses in the crankshaft and connecting rod bearings at the same revolutions per minute. If the motor design is such, as to permit one to take full advantage of the possibility of making bearings of smaller diameter all through the crankshaft in the long-stroke motor, the gain in power effected thus by lowering the work of the bearing friction is very considerable. In multicylinder motors the power gain would approach 5 to 10 per cent. of the brake horsepower. But quite frequently it would be found that the modern crankshafts with a more or less great span between their main bearings necessitate excessively large bearing diameters to reduce the shaft deflection. The reduction of the bearing length carried out simultaneously does not affect the amount of friction losses, the latter depending merely from the total piston effort, regardless of the thereby caused specific bearing pressure. This practice of large crankshaft bearing diameters makes one thus lose one of the best chances for improvement in the motor power output as afforded by the long-stroke motor. In other words, in such construction with large bearing diameters one sacrifices one of the chief advantages of the long-stroke motor type.

The consideration of the mechanical losses leads one directly to the matter of wear in the various motor parts, respectively, to the life and endurance of the motor. The wearing surfaces in the valve mechanism can be made almost equally large regardless of the stroke-to-bore ratio, revealing a slight advantage in the long-stroke type, the greater height of which affords more space for sufficiently long valve and tappet guides. Inasmuch as the work consumed by the operation of this mechanism also has been found to be practically independent of the stroke-to-bore ratio, it is logical to anticipate that the parts involved are subject to the same amount of wear after similar runs of the different motors, similar in respect to duration, power output, etc.

All other factories being considered the same and the amount of lubrication supplied being of equal quality and quantity.



Illustrating Mr. Batzell's points in the long-stroke motor discussion by giving diagrammatic indications of the important forces involved
Fig. 1—Forces on explosion stroke, showing direction of application when explosion occurs, downward on piston head for driving, etc.
Fig. 2—Angularity of connecting rod transmits thrust to cylinder wall, giving the factor that causes friction between piston and cylinder
Fig. 3—Point of application and direction of thrust between cam and push tappet at different parts of the revolution of the camshaft



Engineers Disagree on Starter Units

Part III

Chief Engineer of the Mercer Factory Believes In Combined Lighting and Starting

Palmer-Singer Engineer Would Combine Ignition and Lighting

THIS is the third of a series of communications from engineers of importance throughout the industry on the important subject of electric lighting and starting.

In this issue we read the views of two engineers who favor the two-unit system. In one case the preferred disposition of the units is to combine the lighting generator with the starting motor and to have the ignition generator or magneto, separate, and in other case the engineer believes that the preferred arrangement would be to combine the lighting and ignition apparatus and to have the starting motor separate.

The advantages claimed for a unit construction of the lighting and starting apparatus includes principally the reduction possible in the weight of the instrument, and in the case of the latter the principle advantage claimed for combining the ignition and lighting system is that it forms a simple unit with the minimum multiplicity of parts.

Should Use Chain Drive—Porter

TRENTON, N. J.—Editor THE AUTOMOBILE:—The whole electrical situation to my mind is almost too young to permit of any statements as to what the ultimate outcome will be with any degree of real knowledge, inasmuch as the different manufacturers that are working on this class of accessory are evidently working in the dark, since the hit-and-miss methods employed seem so widely apart that no real knowledge of the point to be attained seems to be available.

Each one in his turn, through generous advertising methods, creates a following, with the result that the real results obtained cannot have any degree of certainty. Just how nearly the ideal system and the ultimate system will coincide is a matter of conjecture at this time. I do not believe the ignition system will ever be successfully united with the lighting and starting, since one should be high-tension and the other low, and since one is of vital importance while the other is merely a matter of convenience.

Two-Unit Systems Coming

The two-unit system, starting and lighting combined, will without doubt be in the majority within the coming year. The three-unit system is the logical combination at this time, inasmuch as the ignition must always remain separate, which fact seems very apparent owing to the almost universal use of the high-tension magneto with the absolutely satisfactory results obtained. The lighting and starting are separate, pending perfection in either unit. The ultimate will, of course, be to combine these two units for constructional reasons only.

The method of attaching to motors will without doubt be through an inclosed silent chain, inasmuch as this method lends itself more readily to take care of the slight discrepancies permissible in machine work.

The possibilities in regard to weight reduction in the starting motors is very great, owing to the possibilities of extremely high speed within the bounds of safety of an electric motor. Refinements along this line will be very rapid, I believe, as soon as a little concerted effort and thought are applied along this line.

The accesibility of the battery and its location are items that call for very little thought, since a properly regulated device eliminates the need of inspection except at general overhauling times, which means that accessibility is not at all essential, and the initial excessive draw from the starting battery that is now considered injurious theoretically will, I believe, be taken care of by the battery manufacturers without any trouble whatever.

The danger from short circuits or damage of any kind due to tampering by curious people with unprotected systems I believe to be something that can be forgotten, inasmuch as the general feeling along this line is produced from a lack of knowledge, and not from any real danger of destruction, as seems to exist in the minds of many at this time. My contention along this line is borne out by the

The Six Questions

1—*Which will be the eventual system, namely (a) Unit system in which starting, lighting and ignition are combined; (b) two-unit system in which starting and lighting are combined with ignition separate; (c) three-unit system in which ignition, starting and lighting are separate?*
2—*Respective methods of coupling starting motors with the gasoline motor?*
3—*Possibilities of weight reduction in starting systems?*
4—*Increased accessibility of the battery for starting and lighting purposes and if excessive initial draw from the battery is injurious?*
5—*Positive locking means whereby tampering by outsiders cannot lead to shorting and discharging of batteries?*
6—*Movement to discourage senseless demonstrations of starting motors in which they are used to propel the car for a short distance?*

past existence of the same queries relative to things more important and liable to damage and which are now scarcely ever referred to.

The movement to discourage senseless demonstrations of propelling the car by the starting motor is something that I do not believe applies to the better class of cars, nor to the better class of starting motors. This is so unnecessary and so absolutely silly when considered from a thoughtful standpoint that I believe it can be attributed entirely to some one wanting to demonstrate that point as a means of covering up many weaknesses that exist in the starting apparatus in question. This method of demonstration recalls to mind, and I believe parallels in absurdity, the story of the prospective purchaser of a straw hat in a small store, at which time the proprietor, after enlarging on the good qualities of the hat, made a statement that you could boil it in water for 2 hours without hurting it. The customer replied by asking, "Why boil a straw hat in water for 2 hours?"

Foolish Starter Demonstration

The same can be said of demonstrating a self-starting motor supposed to be designed to crank the motor, obviating the necessity of this arduous task being done by hand, and in no way intended or designed as a means of locomotion. Consequently, why run a car with a self-starting motor? The best means to my mind to eliminate things of this kind is to omit from our argument any one who lacks intelligence enough to attempt anything of this kind, and confine the discussion entirely to men and firms who have, or assume at least, a position of dignity in keeping with a product that needs no such foolish demonstrations to lure a customer by confusing him with demonstrations of this kind as a means of dodging the many apparent faults that really exist.

Enlargement along this line through the columns of reputable journals I believe would be the easiest means of killing practices of this kind, since there can be no doubt in the minds of intelligent men that anything so uncalled for or out of place would not be resorted to except as a matter of detraction, and your readers generally will learn to understand this, with the result that when a salesman starts something of this kind the prospect will without doubt leave the room without buying.—FINLEY R. PORTER, engineer, Mercer Automobile Co.

Simple Starter Has Few Troubles—Forbes

LONG ISLAND CITY, N. Y.—Editor THE AUTOMOBILE:—Concerning the various points in electric lighting, starting and ignition system, for example, which will be the eventual system of the three now being used, namely, unit which combines the three sets, lighting, starting and ignition; a two-unit which combines starting and lighting with separate ignition; or a three-unit system in which each unit is separate to comprise starting and lighting. **In going over the advantages of these three systems, it seems a logical condition that the two-unit system will be the most practical and popular;** A—unit to combine lighting and ignition, and B—unit to contain starting motor. By separating the electric system into two units, we simplify the construction and make it possible to secure more even distribution of weight on the chassis.

The electric lighting and ignition combination is one that will contain as many mechanical and electrical features as can be combined practically in one unit. As soon as we run into a multiplicity of parts on one instrument, the percentage of trouble is increased. By taking a simple starting motor with practically few working parts, the possibilities for trouble are very few.

Regarding the different methods of coupling and starting motors through the gasoline motor, this is one of the most difficult features of the application of the electric system to the present style of automobile motor. The ways of making successful application are very numerous, but very few make it a practical productive assembly proposition. The ideal feature of car design is one that makes assembly possible with the least amount of machine work, setting or trouble. The large number of units which are combined to form an automobile already make the proposition very difficult, and when looking on some of the electrical applications they are an impossible proposition for satisfactory production.

Simplicity Is Desirable

As evolution governs every existing condition, we look forward to a remarkable simplification in the application of the successful electric motor starter. We believe the best application to date is by means of a flywheel with the necessary gear reduction box incorporated in the crankcase. A suitable bracket is provided which enables the motor to be assembled to the crankcase without any trouble or lining up. It also permits ready interchange of motors should any trouble occur. Driving the flywheel by means of a geared ring enables us to use the minimum amount of reduction gearing and permits the assembly of the starting outfit at a point on the frame nearer the center of gravity and furthers the appearance of a clean-cut power plant. Assembling on the front end of the motor necessitates re-designing of the timing gear case and various bearings and gears and makes an unsatisfactory application when two motors are banked one on top of the other.

Regarding weight reduction in starting systems, this is governed by the application used in the design of the reduction gearing and efficiency of the electrical units. At the present time there are several electric units on the market which combine simplicity of design and have reduced the weight of the parts almost to a minimum.

Accessibility of the battery up to date has not been counted an important factor when used with only the lighting system. It becomes very important, however, when used in conjunction with the starting motor. The battery should be located well forward in the chassis, in order that the center of vibration and the movement of the rear springs will not affect the battery by shaking up the acids, causing overheating and spilling. We find a very good position for the battery to be under the driver's seat on the chassis. This permits ready access by lifting the driver's seat. On a roadster body I would suggest that a special compartment be designed right back of the front seat and readily accessible by means of a side door.

Referring to positive locking whereby it is impossible to switch on the current by mistake, or for anybody to start the car and run it by means of the electric starter motor, an application can be worked out by which this is governed by the shifting levers, whereby it is impossible to start the electric starting motor with any gear meshed, and then by locking our gear shift lever, we have the car permanently locked against any interference. It is, of course, very essential that complete instructions be given to the sales department and demonstrators in order that they do not make useless demonstrations on the starting ability of the electric apparatus on the car, and run the car by means of the electric power and motor. This injures the batteries to a great extent and naturally may cause trouble on future demonstrations when power is practically paralyzed by this senseless demonstration.—KINGSTON FORBES, engineer, Palmer & Singer Mfg. Co.

[Attention is called to the nomenclature used in these articles in which the disposition of the ignition system is of great importance. A separate generator and cranking motor is a three-unit system, because the magneto must be taken into calculation. —EDITOR.]

Twenty-passenger automobile buses used by Huntington company. Note the front entrance, enabling the driver to check fares

Indiana Town Adopts Automobile Buses

Huntington Auto Transit Co. Has Six Pay-As-You-Enter Cars in Regular Operation on Hourly Schedule

By James M. Hobart, M.E.

A FEW weeks ago the first automobile transit car line in America was put in operation at Huntington, Ind., and now six cars for passengers and one car for freight are being operated upon a regular street car schedule. White gasoline cars are used, of 40 horsepower, with special bus or transfer bodies, capable of seating about twenty passengers.

The above photographs give a very good idea of the general appearance of these cars, and when drawn up in line at the starting point or general transfer station they closely resemble a train of cars of the usual type.

The cars are of the "pay-as-you-enter" type, the driver making change when necessary, but the fares are placed in a dropper-box similar to that used in old-time Boston omnibuses before street cars appeared. The passenger, upon entering, deposits his nickel or ticket in the fare-box, which is level with and close beside the driver's head. The driver pulls the lever which drops the payment from the upper compartment into the lower one, and this action virtually implies an acceptance of the fare as being of the right amount and in proper form, etc.

There is a double row of seats, one row on either side of the car. Signal for the driver to stop is given by the usual push-button, placed in the stiles or jambs between the windows of the car.

These cars stop to receive and discharge passengers everywhere and anywhere. Preference is made to stops at street cornrs, but the cars will, at present, stop anywhere they meet or overtake a passenger.

The illustrations also show the point in the car where passengers are received and discharged, the door being located immediately to the rear of the driver's seat.

As yet the project is too young to have determined the items of depreciation, tire wear, etc., but from the nature of the work done by these cars the two items mentioned must necessarily be very heavy. The cost of running these cars averages 5.6 cents per mile, including everything except interest and depreciation charges.

The Auto Transit Co. has worked out and adopted a simple and very comprehensive method of keeping the cost-running data, and Form 2, herewith, shows how this bit of bookkeeping is accomplished. The same blank also carries the daily earnings together with the little summation blank space in the lower right-hand corner, which enables each day's statement to be brought into shape to be seen and comprehended at a glance. As this form is filed in a loose leaf binder, it becomes readily accessible for all purposes.

Form 1 shows the manner in which daily reports are made from the driver of each car. This is also a loose leaf form, and an inspection of its get-up reveals the fact that it carries about all the data necessary to enable the officers of the company to tabulate each and any kind of information which possibly could be called for by the most exacting board of directors.

The officers of this company are: J. W. Caswell, president; J. M. Hicks, vice-president; James H. Hessin, general manager; F. A. Loew, secretary, and S. A. Stemen, treasurer.

Their letterhead bears the title:

"The Huntington Auto Transit Company.
"We are giving street car service to the city of Huntington and
"interurban service to the surrounding towns."

During a visit to Huntington, the writer was informed that the origin of this company was due to the action of several real estate dealers of the city who, being desirous of developing outlying property, cast about for means of reaching their property, and here the embryonic Auto Transit Co. had its inception. According to a statement by General Manager Hessin, the shoe fits the other foot pretty snugly at present, as he remarked that now the real estate men were carefully considering and consulting about the regular routes and runs of the cars and were operating in or passing by territory according to the established and to-be runs of the cars.

As by criticism only can things be made perfect, it seems in order to point out a few little things to be changed or avoided in establishing future auto lines similar to the Huntington, and to also point out where the mechanical construction should be improved to meet the demands of the unique service demanded of it.

To a close observer it quickly becomes apparent that the car bodies—the passenger space—is not what is required and is far from what will eventually be adopted for this service. Though the construction is of the best, as is also the design, the bodies even now show signs of wear and distress from the jolting and pounding they are receiving during constant and continuous journeying over roads and streets under every conceivable condition of weather and weather effect.

The trackage in the city limits is excellent, but the country runs are over country roads, and that means great roughness of surface, which must be met and overcome by the cars during constant and innumerable trips. Hence there is everything to wear out these cars quickly, and careful design will be necessary to minimize, as far as possible, the action of the necessarily rough road surface upon the car mechanism.

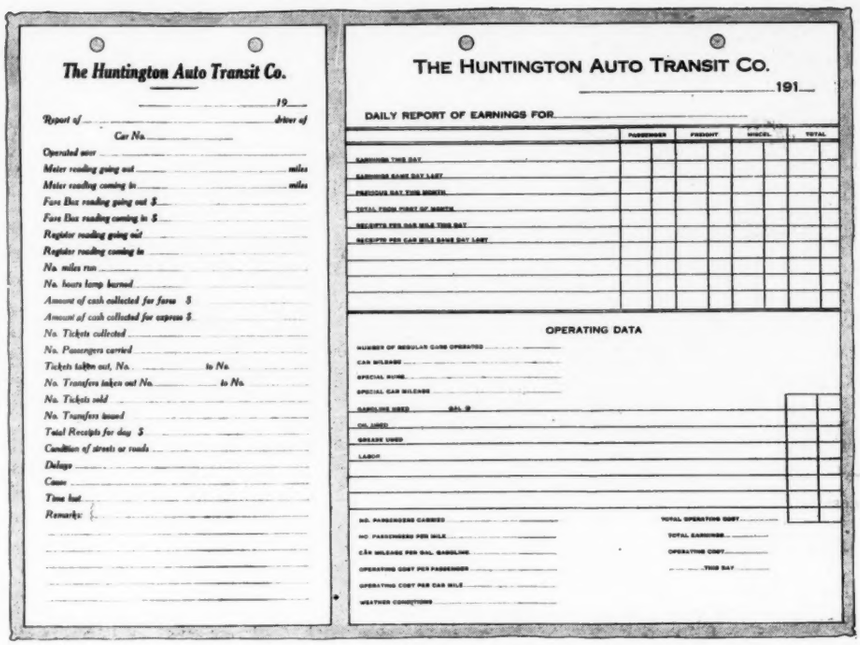
As stated, the cars already show signs of distress, particularly around the joints of the body superstructure. It can be seen that constant working of the parts, one over the other, is taking place, and that in a very short time the rattle of the parts comprising the superstructure will become incessant and intolerable. The remedy is obvious—it is to design and adopt some form of car-body which will not become loose and rattle. The automobile manufacturer has accomplished this with his car-bodies, and it is up to the designers to bring forth a car-body which will withstand the peculiar strains and stresses to which it must be subjected in the work these cars must do.

It is evident that future cars will be changed for the better as regards several of the interior details. The driver's seat, for instance, is so located that he must turn it forward whenever a stout passenger enters or goes out. The fare box is also a misfit in the car, the construction and vibration being such as to remind the observer of the action of a long feather tip upon a lady passenger's hat.

But all these little things will naturally be remedied by the makers of the cars, who have evidently expended tireless energy and skill in putting forth a car which meets as well as it does the very severe requirements of auto street car service. In this direction it is evident that the next cars will be suspended in a different manner upon the rear axle. The present bodies overhang that axle in a proportion evidently adapted from motor-truck designs, and it is probable that this construction will be speedily modified in the design of future automobile street cars. The passage over road roughness of the overhung bodies, when well loaded with passengers, is something to be remembered for a long time. Evidently the wheelbase of the automobile street car must be lengthened, or more of the car placed above the chassis, instead of extending past the rear axle.

The motor truck fashion of distributing the load upon front and rear axles, which seems to have been followed in the arrangement of these cars, will hardly answer for passenger service over country roads, and the quicker this fact is recognized in the design of such cars the better it will be for the operating companies and for those furnishing the cars. Therefore, let the wheelbase be lengthened and the car moved forward over the chassis.

If the changes suggested above were adopted the automobile street car would lose some of the distinguishing features that mark the particular vehicles in question, but with the weight more evenly distributed, though not to the detriment of tractive force, the car would drop some of its appearance of a horse car taking an automobile ride and take on a personality of its own.



Form 1—Daily record sheet. Form 2—Daily earning and operating data

It seems to be a safe prediction to make, that the cost of operation and maintenance of these cars will be large in relation to tire wear and gasoline consumption. In fact, it seems that the latter point has already been well determined, but that the cars have not been long enough in operation to have furnished data to show what the tire mileage will be.

The prediction that the cost of the two items mentioned is to be high is based upon the peculiar service conditions under which these cars are to be operated. They must stop very often. It is safe to say that one of these cars will stop and start—retard and accelerate—ten times to once of the ordinary automobile while making the same mileage.

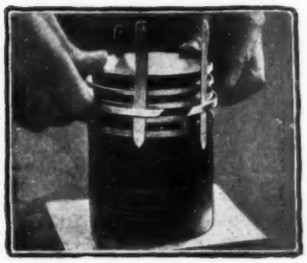
Frequent starting can only result in a larger consumption of gasoline, for the tractive force necessary is greatly increased thereby. The tire wear is also affected in a double ratio by the frequent stops and starts, for the tires have to withstand the drag of stopping the car, also the push of the accelerating force in starting.

But, be the cost as it may, the automobile street car will find a field of its own and will prove very popular with both its owners and with the public, after it has been whipped into proper form and adapted to the as yet not fully understood needs of the service it is to render the public.

At this writing, the Huntington cars are covering routes as long as possible under hourly schedules, running continually from sunrise until travel ceases at night. Morning and evening, factory runs are made to accommodate the workmen, and seven factory runs in the morning and three at night, over as many different routes, take care of all travel in that field, the evening factory runs being duplicated as required by the traffic, two cars being run at the same time when found necessary.

With the limited number of cars in service at present, hourly runs are all that are possible while covering the large territory which they now serve. In order to make the service as comprehensive as possible, the service is divided into three divisions. Hourly cars are run from transfer corner over each of these divisions from 7 a. m. until 10.30 p. m., except at evening for factory runs, as described.

In order to cover still more territory, branch routes are scheduled, the car on even hours running to one portion of the outlying territory, while odd hour cars cover out-of-city travel in other directions.



The Rostrum

Amidship Gearset the Most Accessible

EDITOR THE AUTOMOBILE:—I have read with interest the opinion of your correspondents on the location of the gearset and think it is educational to the user, even if it does not result in the manufacturer getting down to a standard. I have had considerable experience in repairing, driving and owning cars and one very important point for the buyer to look for is accessibility of parts for repairs in the garage or by the roadside.

First—Let us consider the motor, clutch and gearset as a unit. This seems feasible; securely put together it must surely remain in alignment, but should you wish to take down the clutch for new lining or new disc or adjustment, etc., as the case may be, you must remove the gearset with its levers and connections before you can begin at your work at all, or should it be necessary to take down the engine, you have a heavy power unit to lift out, which may be easy in a repair shop, but not so in a private garage.

Second—Considering the rear axle location, any repair man or driver of experience will bless the designer who makes a differential that is accessible and easily taken out to replace a broken pinion or stud or worn rear axle. This part of a car must necessarily be strong and compact, and the less parts you attach to it the better. On most cars the only way you can reach them is on your back or in a pit. To the majority of owners this is like taking bitter medicine. Regarding the extra weight on the rear tires, it seems to be a knockout blow for the gearset in this locality, but my experience on the runabout type is that there is not enough weight on the rear tires, and this extra weight helps them down to the road and prevents much bumping and skidding. This advantage is offset, however, by the fact that the extra weight added to the bearings shortens the life of the axles and bearings. On heavy touring cars there is enough weight on the rear, and in no car I ever took down would it be convenient to get at the gearset for repairs or attention if attached to the differential.

When the gearset is placed amidship with joints that can be disconnected without removing either the driving shaft or the clutch and engine, it is in a position where it is most accessible for removal or inspection or attention by lifting the foot board, and is convenient for designing for any position of driver or control and its weight distributed on four tires.

The great army of owners of cars of today include a large number of men who have their cars for the pleasure they afford them and who must keep the cost of maintenance down to a minimum and who find it necessary to do as much as possible in taking care of their own cars, even to replacing new parts. We who have been there, know that the cost of putting a new part in or adjusting a differential is doubled by the labor of taking it down and putting the case together again, and accessibility of all parts is a great factor to those who of necessity or choice take care of their own cars.

Buffalo, N. Y. JOHN A. SHOEMAKER.

Muffler Increases Back Pressure and Reduces Horsepower of Motor

Editor THE AUTOMOBILE:—Does a gasoline engine develop as much power equipped with a muffler as it does without one? Will you get as much mileage out of your gasoline if you use a muffler as you will by using the muffler cut-out? In other words, will you get more power and mileage out of your gasoline by using the muffler cut-out?

Paris, Tex. W. F. DULANEY.

—In general it may be said that there is a slight difference in power in favor of the engine running without a muffler. This is true because the muffler generally adds to the back pressure and hence cuts down the output of the engine. When running with a clean muffler, however, and one which has been properly designed for the car, there is so little difference that it can never be noticed by the person driving the car. In fact, it has been shown that at some speeds there was more power delivered when the cut-out was closed than when it was open. This is exemplified in a test made by the Packard company some time ago, in which it was shown that a clean muffler which was of the proper capacity for the car would not decrease the power output of the motor. At the lowest motor speeds there was actually a greater output with a muffler than without.

Careful Use of Brakes Lengthens Their Life Materially

Editor THE AUTOMOBILE:—There is more art required in properly driving down a hill than imagined. In order to do it properly you should first climb a hill, which of course is out of the question when you are touring in many parts of the country. Quinturo street hill in this city is a typical one requiring good driving, it being long with an even descent of 25 per cent., this percentage not by guesswork but by a city engineer's survey. This hill has a right-angle turn and also a deep gutter at the bottom.

In descending such a hill I invariably use low gear and close the throttle and auxiliary air device of my Oakland type. By manipulating the foot brake and by slipping the clutch so that the momentum of the car is not allowed to spin the motor, but only turn it over slowly, slow the car on the grade and finally stop it. Then, slowly releasing the foot-brake, I hold the car on compression alone on the full grade of 25 per cent.

In holding a car on a hill with the motor, the electric switch for the ignition should always be turned off unless the hill is not more than a 7 or 8 per cent. grade, and then, if the car is equipped with a gas saver this can be held wide open.

On a slight grade the car can be held on the high gear. On

a more severe hill the second gear may be used, but on a very steep hill low gear should be used with throttle and gas saver both closed. When these are closed the passage of air to the cylinders is greatly restricted and partial vacuum is created on the down stroke of every piston, thus greatly increasing the resistance the engine offers in turning over and making it a much more powerful brake.

In going down long hills that are not too severe, the throttle or gas saver should be left open with the electric switch off, and the gases rushing into the cylinders cool the motor rapidly. In using the brakes, first one brake and then the other should be used, so that neither gets too hot and burns.

Above all, never let your car get to traveling too fast on a bad hill. If your rear wheels start to sliding, release your brake slightly and then apply gradually, because a sliding wheel does not offer as much resistance as one that is turning gradually and the sliding will, of course, ruin tires.

Los Angeles, Cal. GERRY WOODHILL.

Adjusting Cole Steering Gear

Editor THE AUTOMOBILE:—Will you kindly explain by means of a diagram how to adjust the steering gear on the 1913 Cole 40. Also show the construction of the Spicer universal joint used on the same car.

St. Louis, Mo. E. H. K.

There is one adjustment point on the Gemmer steering gear used in the Cole car. Referring to Fig. 3 the nut lettered A, takes up on the thrust bearing and takes the end wise play out of the steering column while the other adjustment is more on the nature of a replacement consisting of replacing the bushing shown in Fig. 3. If it was desired to bring the sector closer to the worm it would be possible to do so by having an eccentric bushing bored and replacing the straight cylindrical bushing with it. The eccentricity of the new bushing would be equal to the amount which it was desired to move the sector closer to the worm.

Both these adjustments are simply made and except in case of replacing the bushing by one of eccentric bore, it would not be necessary to call in the help of an experienced man. Before turning the nut A it would be necessary to loosen the two pinch nuts B on the steering gear housing which is split.

The construction of the spicer universal joint may be readily understood from Fig. 4, which shows the disassembled view of the joint. The parts go together in the order in which they are shown in the illustration.

Changing Fenders on Ford Car

Editor THE AUTOMOBILE:—I have a 1913 model Ford runabout, the rear fenders of which I do not like, and wish your advice as to whether I could place a rear fender from a 1912 model runabout on this model without a great alteration. Will this fender improve or deprove the appearance of this car?

1—While running at a speed of 30 miles per hour, the lower oil petcock opened and let all the oil out until the engine stuck dead. After pouring oil in again and cooling engine, it appeared to run as well as before. What injury to the engine could this have caused?

3—Will it injure the magneto of a Ford car to use it for lighting current, either for two or five lamps. While running at about 10 miles per hour will it supply enough current to keep up lights.

Courtenay, N. Dak. ED. SODEWOSSER.

1—It will not be possible for you to put the 1912 fenders on the 1913 car because the shape of the body will not permit it. The flange on the 1913 fenders extends straight down the body while on the 1912 fenders the flange went underneath the body. The matter of improving the appearance of the car is entirely one of personal feeling and preference.

2—If you are lucky you have probably escaped without damage. The possibilities of the case are enormous and very often lead to the requirement of new cylinders or at least of having them rebored with new pistons and rings. The seized piston will often score the cylinder before it finally sticks.

3—The Ford magneto is powerful enough to be used to operate headlights and there are many cars successfully using this system. Enough current will be supplied at 10 miles per hour for the lights. It is a fact however that the ignition current suffers on account of the heavy drain on the magneto and the magnets will have to be recharged more often. There are many Ford lighting systems on the market that will fulfill your requirements.

Wants Description of Holley Carbureter

Editor THE AUTOMOBILE:—A recent issue of THE AUTOMOBILE had an excellent print of Rayfield Carbureter. Could you print one of the Holley type, explaining how to adjust same?

Sag Harbor, L. I. G. S. SCHEFKE.

A section of the Holley carbureter is shown in Fig. 1. It will be seen from the illustration it is of concentric type. The main air passage does not pass vertically through the center of the instrument but enters from the side and has the air deflected downwards by means of a venturi-shaped mixing chamber. The air must pass around the outside of this chamber and goes through the passage N in the illustration. The entire air supply must go through this passage.

The cork float mechanism C is conventional and fuel enters the float chamber through the needle valve V, after having passed through the strainer disk A. Gasoline enters from float chamber through a drilled opening F which takes it to the needle valve passage. From the needle valve passage or nozzle well the fuel enters the nozzle proper through the holes H, rising past the needle valve I and lodging in the cup shape upper end, just submerging the lower end of the tube J which extends to

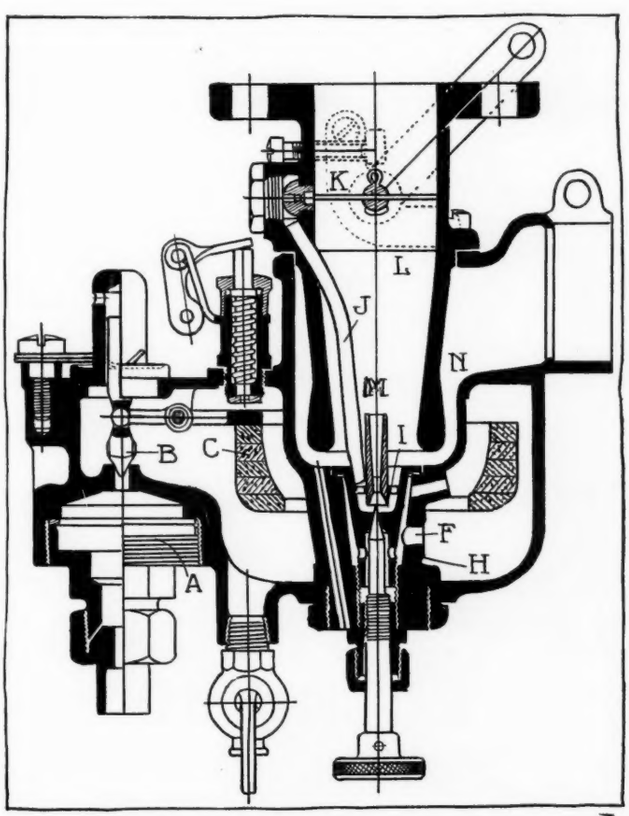


Fig. 1—Section through Holley carbureter, showing adjustment points

Makes Emergency Repair on Axle Housing

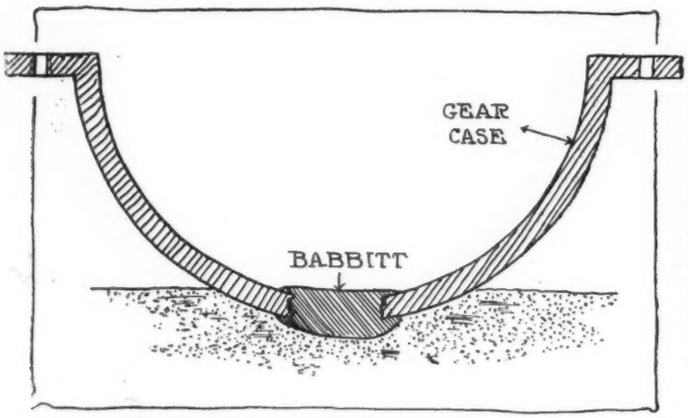


Fig. 2—Differential case after repair was made

the end of the throttle disk controling the supply of fuel to the engine. Cranking the latter with the throttle nearly closed draws the fuel from the well through the tube J and the calibrated plug K directly to the manifold priming the motor and acting as an easy starting feature.

After the engine is running the fuel sprays through the needle valve up through the tube M and then to the motor through L. When running air is drawn through the hole M surrounding the stand pipe M and part is drawn up through the tube J keeping the starting well entirely cleaned out.

There are no spring controlled air valves, th esuction being depended upon for the control of the air supply. The standpipe M has a venturi shape, aiding in the fuel vaporization. The carburetor has only one adjustment, that being of the needle valve I which is controlled by the knurled screw at the bottom. In making the adjustment start the motor and turn he needle valve o the right as far as it will go with the engine running smoothly while idling. Then try the motor at higher speed and if it backfires turn the needle valve to the left until the action is satisfactory. If the motor smokes turn the needle valve still further to the right and take up on the throttle stop screw so that the throttle cannot be closed far enough to stall the motor.

A feature of this carburetor is the utilization in the nozzle action of the pressure drop due to the velocity of the air drawn through rather than the pressure drop causing the air to flow, making the carburetor automatic in its proportioning functions. Having once fixed the needle valve the ratio of air to gasoline is theoretically the same throughout the entire range of engine speed.

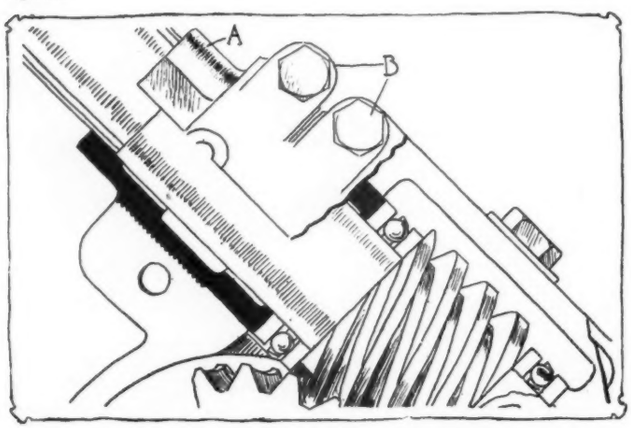


Fig. 3—Adjustment points on the Gemmer gear

Babbitt Serves the Purpose

EDITOR THE AUTOMOBILE—Not a very long time ago while in charge of a small machine shop out west in which we did odd jobs, an automobile drove up to the door with a formidable looking hole, 2 inches square, in the aluminum casting of the differential gear casing. The driver had struck a rock in the middle of the road and all the lubricating oil had run out, the hole being in the lowest point in the case. I was asked whether or not we could repair it. The owner of the car wanted to complete his contemplated run that day which was a considerable distance in view of the rough and dusty roads. He was afraid that lack of lubricant and the possibility of entrance of dirt into the case would hurt the gears.

Being a consistent user of babbitt or lead in many repair emergencies and having repaired smaller holes in castings of other machines by its use, we told the owner that we would fix him up in a hurry.

We took the casting off, prepared a sand mold, Fig. 2, melted some babbitt metal and poured the hole a little more than full. We then beaded the edges of the babbitt with a hammer to safeguard against oil leakage, and the job was completed. The owner lost about an hour's time, most of which was lost in debate over the advisability of making the repair and the possibility of making it permanent.

There is no reason why the method used should not be permanent unless the chauffeur has struck another rock.

Repairs similar to this can be made right out on the road provided you are equipped with a blow torch, some babbitt or lead, and a ladle.

Brooklyn, N. Y. W. F. SCHAPHORST.

Troubled by Persistent Miss

Editor THE AUTOMOBILE:—I am using 1911 model M Franklin car, which from the outset has given trouble because of the third cylinder missing. On examination, the spark plug is always fouled with oil. A change of plugs and cutting down the oil supply made no difference. Finally the cylinder was suspected and a new one installed with new piston rings. This gave little relief. The car sometimes would make a good run or part of a run, hitting on all four. Then, again, I would have to work my passage home changing plugs. I wrote THE AUTOMOBILE, and they suggested the possibility of a too small piston. The agent acting upon this theory installed a new piston and rings. This helped the matter and for a time I thought the trouble over, but after a while it came back. Now, what can be the trouble? The car is equipped with a high tension Bosch magneto. No batteries. Do you think it possible that a poor current is delivered to this particular cylinder from the magneto, and thus allowing an accumulation of oil in the firing chamber, which after awhile fouls up and kills the plug?

The magneto is a D. U. 4 model. Some say the current is necessarily alike on all cylinders. Others tell me differently, and think the magneto is at fault. The valves and all parts of the motor have been kept clean and in the best condition. Good compression and plenty of power when all cylinders are firing. I know of no other Franklin giving trouble of this kind, although, some drivers use oil in large quantities.

I might add, that usually the missing starts on slowing down or stopping, for instance, the car will sometimes make quite a run on a steady speed of around 20 miles per hour, and then when slowing down to turn around will start the missing which will continue until a change of plugs is made or the cylinder

cleaned out. I use as clean a mixture as I can after the motor is warmed up, and find no deposit of carbon in the cylinders to speak of. The plugs in all the cylinders but the missing one are always clean and dry.

2—I desire to ask another question not connected with the trouble aforesaid. The magneto in my car is driven through a governor which controls the spark automatically instead of the usual lever on the steering wheel. Sometime ago the magneto had to be taken out to replace a broken spring in the governor, and since that time the motor has developed a slight knock when pulling down slow on hills. Do you think it possible, that in replacing the magneto that the gear wheel connected to the drive shaft and taken out with it—could have been meshed so as to have advanced the spark too far and this caused the knock? I am told that this could not be the case, as it would give me trouble in starting, etc., but it seems to me reasonable that one cog in either direction would retard or advance the spark without any noticeable effect except as mentioned—on the hills.

Round Top, N. Y. INQUIRER.

It is evident that through some fault in the motor located at that particular cylinder a quantity of oil is forced into the combustion space and deposits a layer of soot on the plug and prevents it from firing. The fact that the trouble was temporarily cured by fitting new pistons shows that the oil leaked from the crankcase passed the rings and into the combustion space. If this supposition is true the trouble could be cured by fitting piston rings which are specially designed to prevent leakage past them. These rings are designed especially for the purpose of stopping oil leaks from the crankcase and although heavier than the regular ring and creating more friction, they should cure the trouble.

Another method you could use of preventing an excessive amount of oil leaking by the ring would be to have an oil groove cut in the piston. The oil groove could be located below the lowest ring and should be cut to a depth of ⅛ inch and holes drilled through the piston wall to drain off the oil caught in the groove.

Another method of preventing the oil from leaking up into the combustion space is that shown in Fig. 5. This device was patented by F. D. Howe of Akron, O., and operates as follows: A groove about the dimensions shown in Fig. 5 is sufficient without the holes leading to the interior of the piston. The essential feature is the exposure of the lower edge of the ring, the sharp edge of which scrapes the excess oil off the cylinder wall on the down stroke into the storage space provided by the groove. At the bottom of the stroke the inertia of the oil and the upward movement of the piston crowd the oil into the sharp lower part of the groove, where it tends to distribute itself upon the cylinder wall as the piston moves upward. There is a ratchet-like action, tending to work the oil away from the combustion chamber but not removing the oil from the cylinder wall, where it is wanted both for lubrication and as a packing. A very gradual approach between the piston surface and cylinder wall at the bottom of the groove is the secret of success with this device, and it is well to round off the junction line of the piston with a file. In those exceptional cases where this form of groove does not take care of all the oil, diagonal may be added as shown in the second sketch. It is not necessary to add a ring at the bottom of the piston as the groove can be, and usually is, applied to the ring next to the wristpin.

Still another method which is rather dangerous on account of the fact that it is apt to starve the lubricaion of that cylinder would be to put a baffle plate in the bottom of the cylinder. To do this a sheet-copper plate is bent in the form of an angle iron and then bent around the lower part of the cylinder below the sweep of the piston. Two slots are cut in the plate to permit the connecting rod to pass through on the up and down stroke of the motor. The oil thrown by the scoops on the connecting rods will strike this baffle and be held there or thrown back, instead of thrown up into the cylinders. The dangerous part of the baffle plate is in making it too wide. If this is done insufficient oil reaches the piston and through the faulty lubrication it eventually binds in the cylinder.

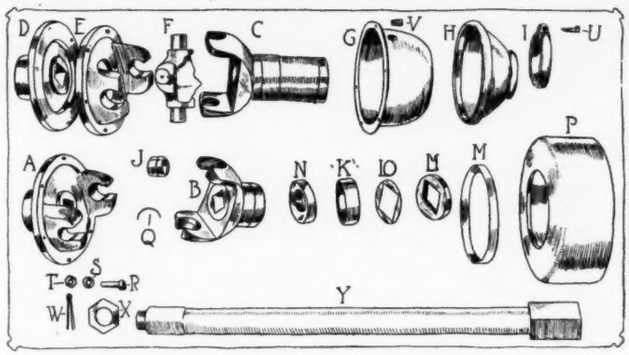


Fig. 4—Parts of the Spicer Joints

A—Disc Yoke	L—Felt Washer
B—Ball Yoke	M—Packing
C—Sleeve Yoke	N—Steel Washer
D—Comp. Flange	O—Brake Drum
E—Flange Yoke	P—Bush Retainer
F—Journal	Q—Bolts
G—Inside Casing	R—Lock Washers
H—Outside Casing	S—Nuts
I—Lock Nut	T—Cotter Pin
J—Steel Bushing	U—Shaft Nuts
K—Dust Cap	V—Shaft

There is a possibility that the trouble is not caused by the oil at all. You can determine this by cleaning the plug until it is bright and then immediately the motor starts to miss, remove the plug and see if it has lost its brightness and the points are carboned. If the two facts are coincident the trouble is with the oil.

2—Your supposition in the matter of incorrectly assembling the magneto drive is probably correct. It is very well possible for the timing to be one tooth out of the way. This would cause a knock when the motor was running slowly although it might not necessarily show while idling. The cure for the trouble would be obviously, disassembling the magneto drive and slipping the gears around one tooth.

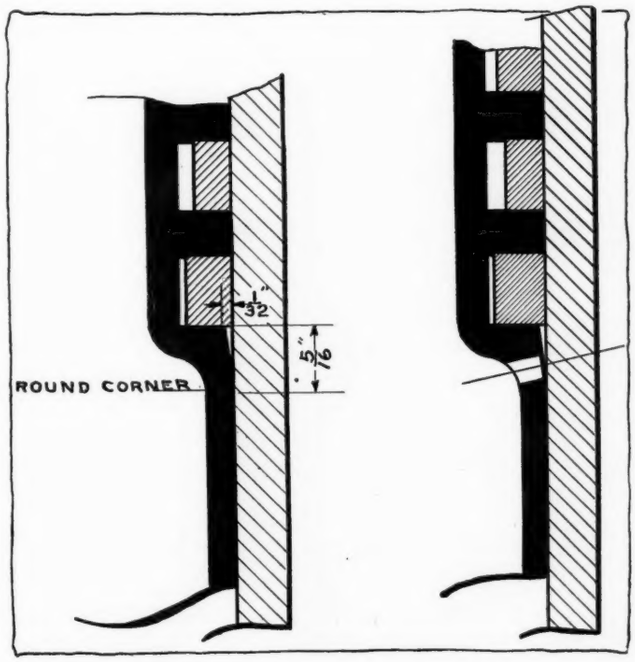
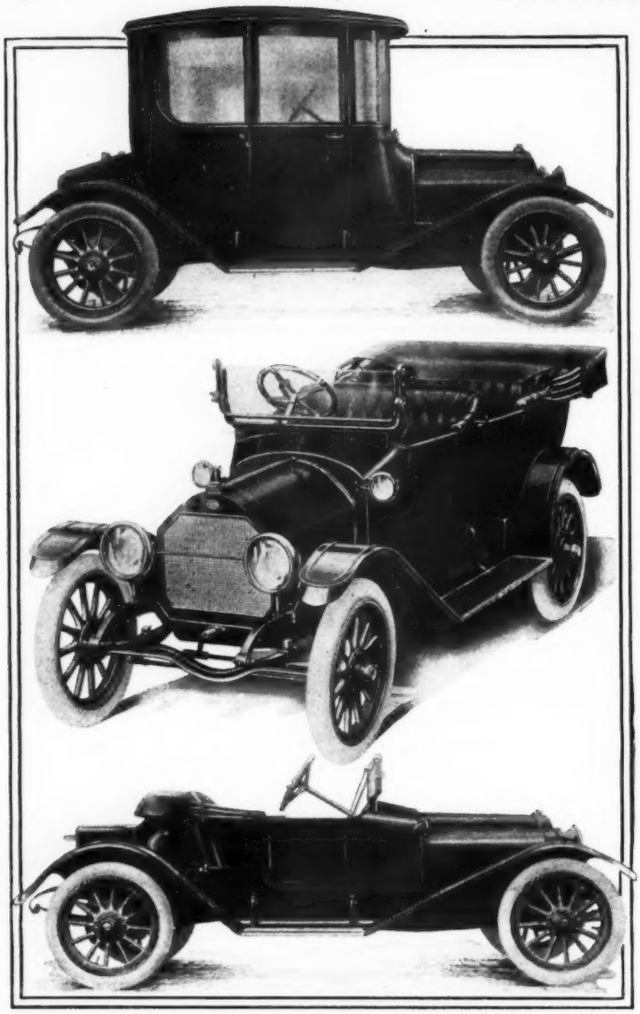


Fig. 5—Section through piston arranged with oil groove



Three types of body on the 1914 Overland
Upper—A new design coupé with a deck on rear
Center—Five-passenger touring car with cowl
Lower—Two-passenger roadster with rear box

Important Changes

Wheelbase increased from 110 inches to 114 inches.
Bore enlarged to 4.125 inches instead of 4 inches.
Oiler eliminated; replaced by gear-driven oil pump.
Lower half of the crankcase is made of pressed steel.
Valve plungers made removable instead of being fixed.
Splitdorf magneto with separate coil for dry cells.
Oil gauge used of same design as was on model 71.
Gray & Davis electric cranking and lighting system.
Fan belt V shaped instead of being a plain flat band.
Frame heavier material—from 5-32 to 3-16 gauge.
Universal joints of heavier design as in model 71.
New and improved clutch brake addes this year.
Muffler cut-out discarded unless specially ordered.
Rear touring car doors now of the full U-shaped type.
Sides 1.25 inches higher with thicker and longer cowl.
Hood lengthened .75 inch with improved fasteners.
Fenders crowned and invisible rivet connections.
Windshield braces extending rearward this year.
Steering column is made larger, with 18-inch wheel.
Accelerator pedal pushing instead of sliding type.

One Overland Chassis for 1914

Important Changes Include Increased Bore and a Longer Wheelbase—Larger Model Discontinued

PRODUCTION plans of the Willys-Overland Co. for 1914 call for the making of even more cars than heretofore with still greater standardization of parts, and to this end only one chassis model is being turned out. On this three types of bodies are fitted—a five-passenger touring car, a roadster and a coupé.

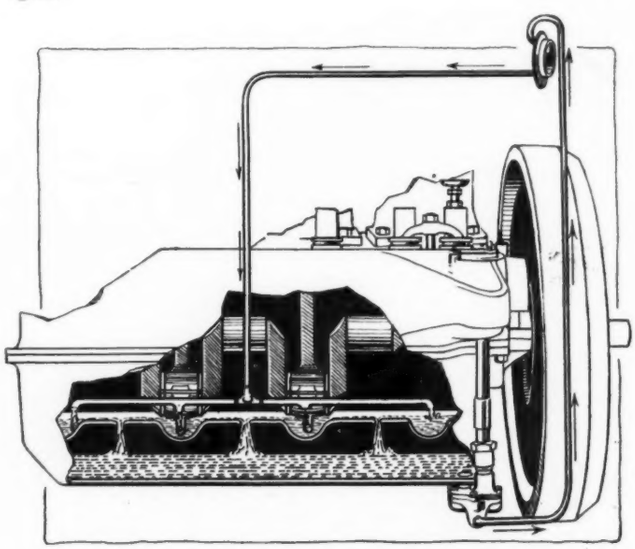
The 1914 chassis is known as Model 79, and is a continuation of the 1913 Model 69 with several changes. A slight reduction in price for Type 79, as compared with that of Model 69, is also a point of interest. The greater production schedule and parts standardization make it possible to shave the price to $950.

Model 71, the larger and more expensive of the two 1913 chassis, has been discontinued.

None of the Overland characteristics of mechanical design has been changed, those alterations which do appear being essentially detail refinements. The four-cylinder, L-head motor with its singly-cast cylinders, the mounting of the gearset in unit with the rear axle, the carrying of the drive shaft within a torque tube, the three-quarter floating rear axle and the right drive are features which remain unchanged. The various changes are given in the first column on this page.

Although the bore has been increased from 4 to 4.125 inches, the stroke remains at 4.5 inches. The motor develops approximately 35 horsepower at normal speed. The valves are on the left. The new type of valve plungers have a yoke or dog which bolts at its center to the crankcase and clamps each set of two plungers for each cylinder in place, so that by removing this yoke the plungers may be slipped out for adjustment.

Lubrication is by splash, the new pump supplying the oil to the connecting-rod troughs through four leads. From the troughs the oil flows into the bottom of the crankcase, and after filtering is forced back through a sight feed and to the troughs again.



Circulating splash oiling, with sightfeed used

All the oil passing through the system passes before the eyes of the operator. The force of the pump lifts the oil to the sightfeed and from there it has the force of gravity to add to its distribution of the lubricant to the splash troughs.

The excess oil drains from the cylinder walls and interior of the motor to a strainer through which it passes before again entering the oil reservoir, thus insuring a clean oil supply.

Both the intake manifold, which has been reduced in size, and the exhaust header are located on the left, the latter occupying a position above the intake. Neither of these is provided with flanges for fastening to the cylinders, but a yoke provided with a single bolt clamps each cylinder's pair of inlet and exhaust connections in place. However, the water connections fasten through flanges.

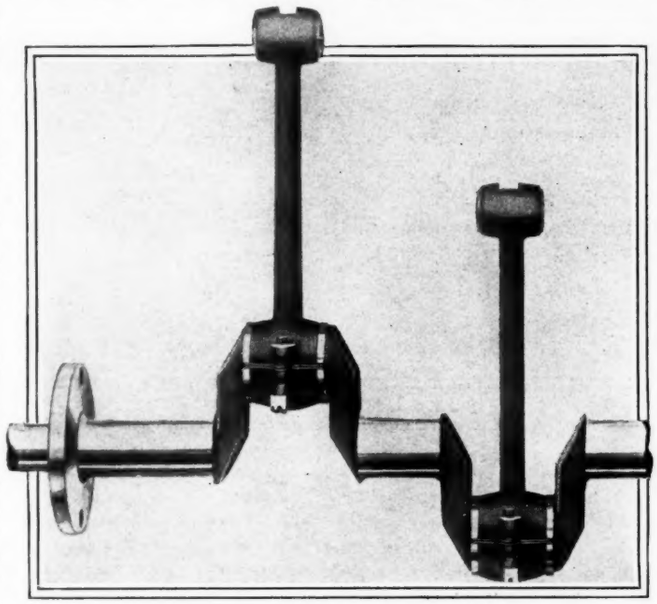
Although pressed steel is now used for the lower half of the crankcase, no change in the design is to be noted. The motor is suspended at two points at the rear by means of integral crankcase arms which rest upon frame members extending diagonally from the side frame rails to the cross brace back of the motor. At the front end the engine rests upon another cross member riveted to the frame.

Five plain bearings carry the crankshaft. The rear bearing is much longer than the other four, it measuring 3.125 inches, while the others measure 1.75 inch each. The connecting rod lower bearings are also 1.75 inch in length. The camshaft is carried on three bearings.

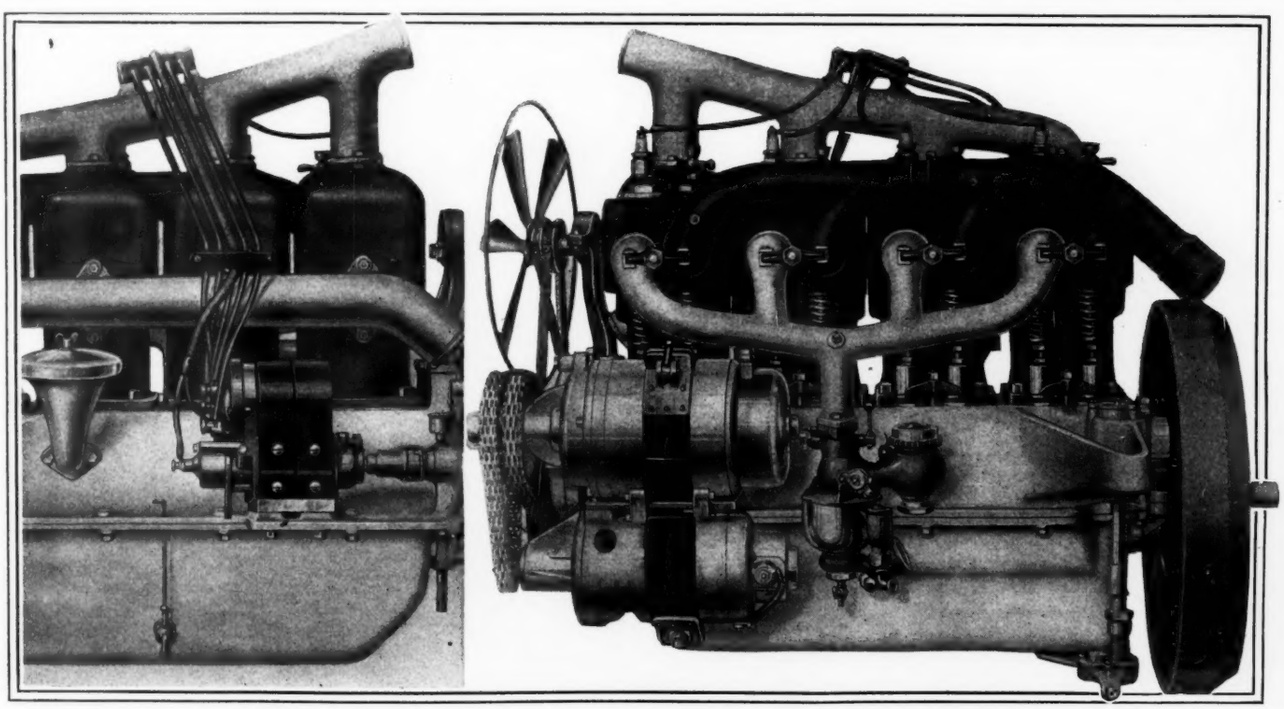
The motor's new type of ignition, a Splitdorf magneto with a coil for the dry cells, furnishes a dual system. Model R Schebler carbureter is used.

The Gray & Davis electric cranking system is included at a slightly increased price. Due to the present demand for self-cranking cars, it is probable the majority will carry this added feature. This system consists of two units, an electric motor and a generator. These are fitted to the valve side on brackets, which are a part of the crankcase. They are driven through silent chains from the front end of the crankshaft.

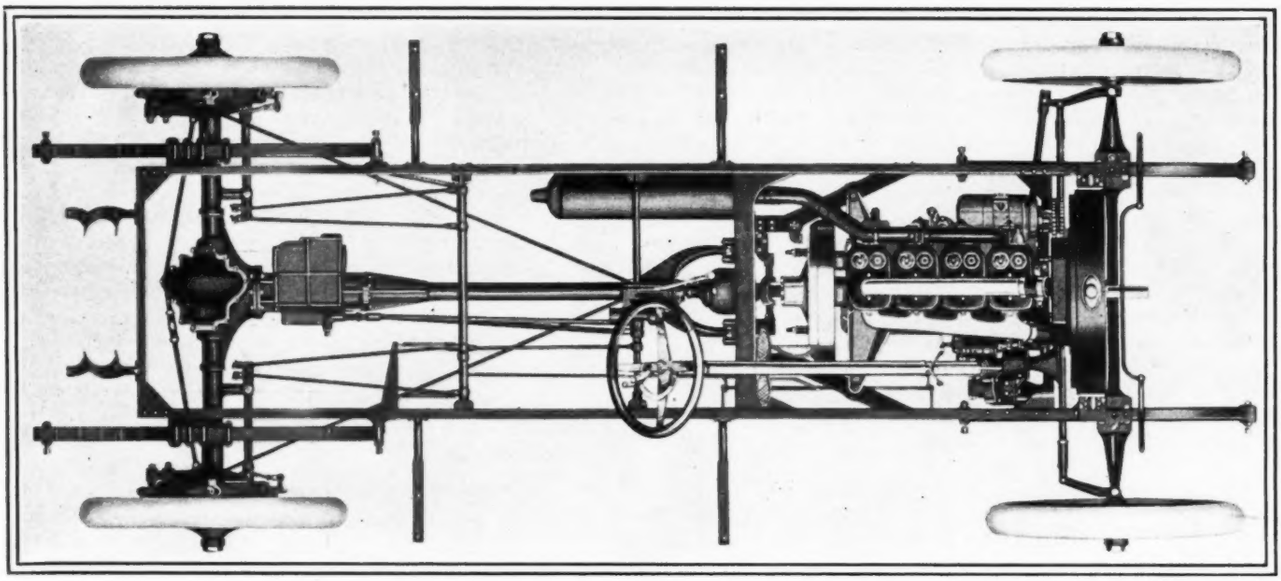
The generator, which is driven whenever the engine is running, charges the storage battery, which, in turn, gives out its energy for driving the electric motor when it is required to turn the crankshaft for starting. Cutouts and switches prevent the overcharging of the battery, provide for the sending of the generator current direct to the lights at night when the generator voltage has reached a certain height, due to the engine speed, and connect the battery current with the lights when the engine is not running at night. A centrifugal governor is a part of the governing apparatus whereby the armature speed of the generator is maintained practically



View of the crankshaft, showing the relative sizes of the bearings. The length of the rear bearing, which takes the weight of the clutch and flywheel parts, should be noted. This bearing is almost twice the length of the other main bearings, measuring 3.125 inches, while the other main bearings have a length of 1.75 inches. As will be noted, the lower connecting rod bearing caps are fastened to the other half of the bearing by one bolt. The upper end of the connecting rod is solid, and in assembling the piston pin is passed through the opening on the piston wall and then through the bearing bushing in the upper end of the connecting rod. The connecting rod is an I-beam



Magneto and valve sides of motor, showing magneto drive, wiring and manifold design



Plan view of the Overland chassis, which is standard for all types of body for 1914

constant above a given speed of the gasoline motor crankshaft.

The cranking operation consists of switching on the ignition current, after which the starter pedal is pressed to send current to the starting motor.

Thermo-syphon cooling is made more efficient by the radiator being the same as that employed on Model 71, the tubes being enlarged. Cooling is further augmented by the extra large water pipes for both inlet and outlet.

The fan belt is V-shape, a flat belt having been used heretofore. Special interest attached to the method of adjusting the belt tension by means of an eccentric mounting of the shaft carrying fan and pulley. The eccentric is carried in a bracket fastened to the crankcase and not to the front cylinder. To adjust the belt it is only necessary to loosen the bolt which tightens the band around the eccentric and then swing the latter until the desired distance between pulleys has been obtained.

The leather-faced cone clutch, with its brake to aid in gear-shifting, is continued.

The torsion tube inclosing the drive shaft is yoked at its forward end, its two arms being hinged to the frame cross member to allow for variations of the axle position with respect to the frame, since the tube bolts to the gearbox at its rear end, and this in turn is rigidly bolted to the axle housing. To assist in the maintaining of the proper position of the rear axle, radius rods are also used.

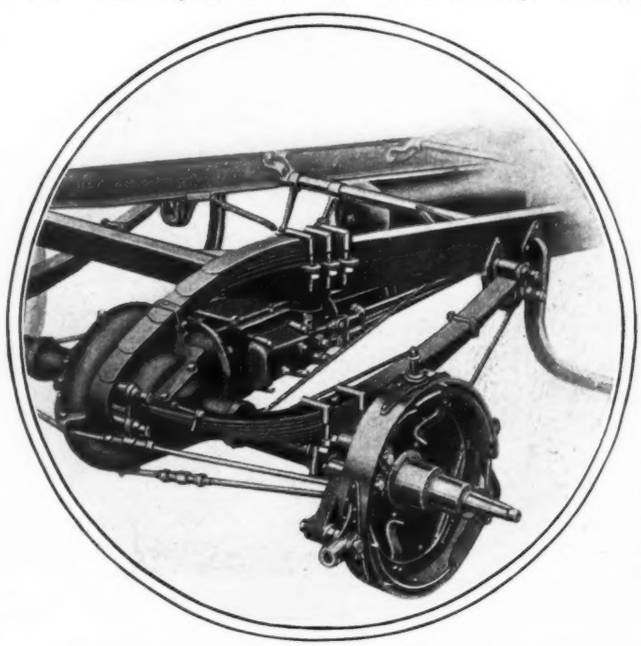
In accord with general practice, where a torsion tube incloses the propeller shaft, a single universal joint at the forward end of the shaft is fitted. On the new model 79 this member is the same in construction as that used on model 71. The ring-and-slip joint are made entirely from drop-forged parts.

The gearbox, of characteristic Overland design, bolts through flanges to the axle housing and to the torsion tube. It is a selective, sliding gear type affording three forward speeds, the gears being shifted by a center lever. The main and countershaft are as short as possible, which obviates any chance of their springing. Imported annular ball bearings are used throughout the gearset.

The rear axle, a three-quarter floating type, is carried on Hyatt roller bearings. The three-quarter construction is so designated because the inner end of the axle shaft floats, whereas the outer bearing is mounted outside of the axle housing, so that the shaft does not carry the weight of the car. The pressure of the wheel is in line with the center of the bearing, thereby avoiding bending stresses on the axle shaft. Side thrust on the shaft is borne by a special thrust bearing at the inner end.

Conventional expanding and contracting brakes act on the wheel drums. The drum diameter is 13 inches, which gives ample braking surface. Brake equalizers are retained.

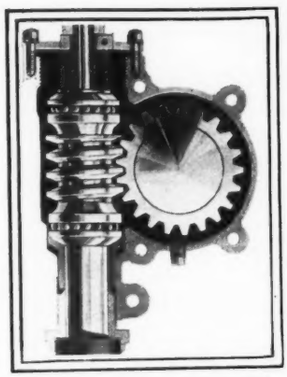
Steering is by means of an adjustable worm and gear, with the housing anchored to the side frame rail instead of to the cross member, as formerly. The column is larger and the wheel increased to 18 inches in diameter. On the column and below the wheel is a lever for throttling the carbureter air for starting. The muffler cut-out is left off.



Overland brake and spring mounting with adjustments

Due to the lengthening of the wheelbase 4 inches over that of Model 69, a longer and more rangy body, both in appearance and in actual room for the passengers, is obtained. The increased wheelbase is given to the body almost entirely, only .75 inch being added to the length of the hood.

The clear running board and smooth-sided effects are very pronounced, door handles being removed from the outside, as well as all other unnecessary details. The fenders are crowned and rivetless, a new feature for Overlands, which lends to the appearance. The rear fenders follow the line of

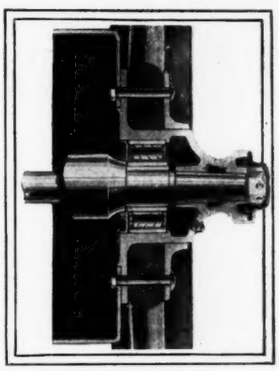


Worm and gear steering

the wheels, while the front fenders slope away with a reverse curve to meet the long running boards.

The doors, too, are changed, they now being of full U-shape. In general the body sides are .25 inch higher than formerly, and the cowl has 1 inch greater height. Cushions are .5 inch thicker than on preceding models.

The roadster chassis has been lengthened and has the gasoline tank mounted back of the seat, and behind this is a square luggage or tool box, replacing this season's sloping type. Windshields are braced to the rear instead of having their brace rods running forward as heretofore. Nickel and black enamel figure prominently on the fixtures. Top, tool and tire repair equipment are provided. The body types give the purchaser a choice between a touring, roadster and town type. The latter in coupe style is a distinctive design with a short rear deck that adds greatly to the appearance.



Roller wheel bearing

New Motor Has Great Accessibility

THE Partin-Palmer 38, the product of the recent Partin & Palmer combination of Detroit, embody several interesting features in motor car construction. The most striking feature of the new car is the motor.

It is of the block type with the valves in the head. The cylinder casting is integral with the upper half of the crankcase, eliminating the joint at the base and distributing the bearing load to the crankcase walls through continuous webbs or bridges.

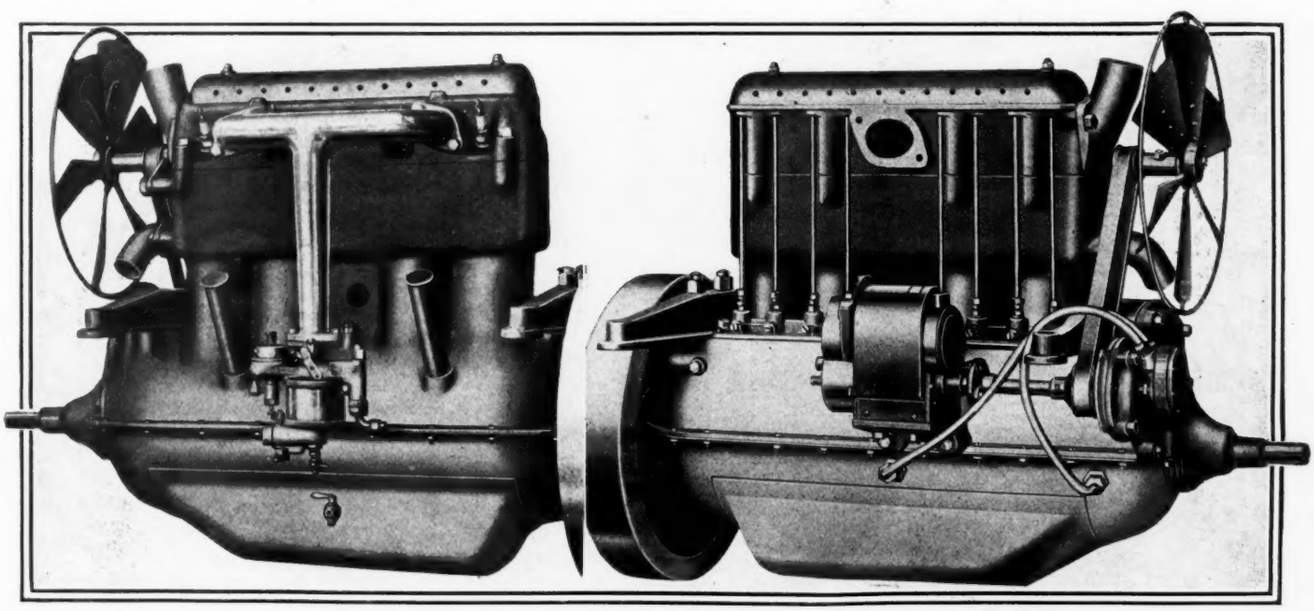
A departure from the standard overhead type, which may be observed in the illustration below and which the makers claim achieves the object of eliminating leaky cages, softened valve springs, etc., is the valve in the head casting which is secured to the cylinder by bolts. The joint between the casting and the cylinder head is sealed with copper asbestos rings held with a pressure of more than 3,000 pounds to the square inch. The casting is in one piece and can be removed by taking out these bolts.

The spark plugs are set at an angle in the head casting and the valves are carried without cages. The exhaust manifold is built inside with the outlet brought to one port. The intake enters through the opposite side of the casting. This gives an arrangement by which the valves can be quickly reached on account of the omission of the cages and the ease with which the head can be removed. Both the valves and the stems are entirely surrounded by water.

The water cooling is extended around the exhaust manifold, which has the effect of creating a partial vacuum in the manifold through the reduction of the temperature of the gases in the exhaust pipe. The makers state that the resulting reduction of back pressure gives an actual power increase of 12 per cent on the brake.

Accessibility has been studied throughout the construction of the motor. The piston and connecting rods can be quickly removed without interfering with the radiator connections. Another point in line with these accessible features is the split crankcase, which enables the repairmen to reach the bearings without disassembling the motor. Some of the principal motor dimensions are as follows: Connecting rod bearings, 2.625 inches long; crankshaft bearings front, 3 inches by 2 inches; center, 2.5 by 2.12 inches; rear, 3.69 by 2.14 inches. The piston pin bearing is one inch in diameter and 2.25 inches in length.

Electric starting and lighting is optional and full running equipment is furnished with the car. Control is located in the center and steering on the left side.



Exterior of both sides of the new novel-appearing Partin-Palmer valve-in-the-head motor

New Wolfe Radiator Has Variable Area

Knob on Filler Pipe Regulates Distribution of Water

A LIBERAL application of cold water is most needed when the car is climbing a steep hil on a hot day. This is just the time we do not get it with our present radiator design. The cooling space is the same whether the car is rolling along at 20 miles an hour against a cool wind which is blowing at the rate of 20 miles an hour (a 40-mile gale against the radiator) or if the motor is gasping under a heavy load at 8 miles an hour up Giant's Despair or any other hill with only the feeble draught induced by an inefficient fan.

To meet this condition A. P. Wolfe, a mechanical engineer of Vineland, N. J., has designed a radiator with variable cooling area.

The two accompanying illustrations show front and back views of the radiator. In the front view, the knob K is shown and the three notches in the knob correspond when at P to high, low and mean cooling efficiency. The turning of knob K so as to bring one of the notches to P determines where the water enters the radiator proper and governs the amount of surface in contact with water.

For low efficiency the water only comes in contact with the tubular section from H down. These tubes are of peculiar cross-section, giving about 31 square inches surface in contact per cubic inch of water (about the same ratio existing in the honeycomb type of radiator), but this surface is provided with fins in addition, an advantage over the honeycomb. Each of these tubes divides the water into four thin columns and the fins are all attached to the tubes with comparatively small points of contact but sufficient to feed the heat from tube to the fins as fast as they give the heat off. By this method the attaching of fins to tube does not thicken the walls of the tubes as in other types of radiator tubes. Another advantage is that there is a column of air between the tube surface and the fins, except at the small points of contact of fins with tube.

By referring to rear view, the overflow pipe shows the water level when pump is not working to be at L, and its capacity is about equal to the total capacity of present type of radiators of corresponding size.

If you set the knob K for high efficiency of cooling, the water enters at A and passes through the distributer so that each drum D receives it quota of the total amount of water being delivered, but the water is introduced as a spray and then resolves itself into a series of films of water after leaving the spray chambers, situated in the top portion of drums. As these films descend, they are not only in contact with a cooling metal surface on one of their sides, but on their other side in contact with the atmosphere through and by means of the tubes V. The condition at this point is similar to rain beating on a pane of glass—a film of water held by capillary attraction to the glass—and the other side of film in contact directly with the air. The conservation of the water is taken care of by the fact that there are eighty drums in the first tier. Only one-eightieth part of the water is passed through any one drum in this tier, which means that only one-eightieth part of the total vapor is to be condensed and returned to the drum by means of the tubes V. The water passes on down and is distributed by the lower distributer to the lower tier of 128 drums, and is introduced into each drum in two separate portions instead of one portion as in the upper tier and the condensation taken care of by less vents, or condensing tubes. This creates by this construction an increasing amount of opening for water to flow through as water passes down through the radiator.

This particular radiator shown in this photo was 24 inches wide by 26 inches high. The water was broken up into 4,400 segregated columns of water. The pipe from engine was 1.25 inch round, which would be a cross-section of 122 square inches. Divide this into 4,400 parts and we have an area of .000277 square inches. Compare this with the honeycomb, which has about eighty columns of water and under pressure.

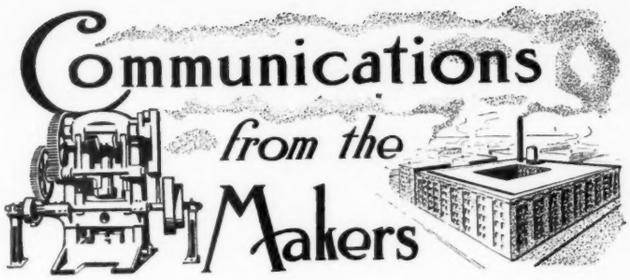
From H up there is no necessity for tight joints, as the reservoir is only up to L and the conditions under which the water flows down are similar to conditions of water on a shingled roof, except at the joints of upper distributer and tubes T.

It is readily seen that the upper portion, as described, acts not only as a pressure reducer but also as a condenser.

The number of drums or number of tiers may be varied according to requirements of motor or shape of radiator.

Front view of Wolfe radiator

Rear view, showing variable area feature



Combines Force Feed and Splash Without Dipping Connecting Rods

AN interesting lubrication system that is giving very economical working results is that used by the Kelly-Springfield Motor Truck Co., Ohio, illustrated in the accompanying sectional view. Correctly speaking the method is a combination of forced feed and splash but it differs from ordinary practice in that no oil is actually lifted by the connecting-rod big end. There is, in fact, never any oil in the lower half of the crankcase proper. Instead, the oil is held in a special reservoir R, which is integral with the lower crankcase, but located at the base. At the bottom of the reservoir ribs are provided to facilitate radiation.

The oil pump O, located at the lowest point of the oil reservoir, is of the gear type and is driven at half engine speed by the camshaft. All possibility of dirt entering the oil circulating system is eliminated by a screen cage surrounding the pump. The oil drawn from the reservoir is discharged through a direct lead L into the main oil channel, which is a steel tube T cast into the upper crankcase parallel with the center line of the crankshaft.

From the main oil channel holes of the proper size lead directly to each of the three main engine bearings. Similar holes run from the main engine bearing leads to each of the three camshaft bearings. From the front camshaft bearing a lead runs into the cam gear compartment, thus supplying a continuous stream of fresh oil for all gears and bearings supporting them. Oil forced by the gear pump under proper pressure is received through the oil leads by each main crankshaft bearing, which contains a groove in it. Part of the oil is used by these bearings, while the remainder is forced through holes in the crankshaft leading from each main bearing journal to each connecting-rod journal. The pressure of the oil forces its way out of the connecting-rod bearings and is thrown on each particular cylinder wall in just the proper quantity for the cylinder lubrication.

The above description shows that there is positive forced feed oiling to every bearing and gear. The only parts depending upon the splash of oil squeezed out of the connecting-rod bearings are the cylinder walls and the cam surfaces. There are no loose connections at any place in the leads carrying the oil. If at any point leads have to be drilled for manufacturing reasons, pipe plugs have been carefully fitted where the drill first entered the crankcase. The surplus oil not used in the different bearings flows back to the oil reservoir through holes from the lower crankcase. A cork float F in the oil reservoir actuates the sight gauge G.

As an indication of the economical operation of this lubrication system it is interesting to note that in a recent test, in which a 1-ton Kelly truck took part the remarkable average of 380 miles to a single gallon of lubricating oil was obtained. This test was conducted by J. W. Moore, consulting engineer of the Standard Oil Co.

Discusses Oil in Packard Test

NEW YORK CITY—Editor THE AUTOMOBILE:—I attach a copy of a letter which I found in my mail this morning. The man who wrote it is entirely unknown to me.—T. E. TOMLINSON, general manager Invader Oil Co.

INVADER OIL COMPANY.

GENTLEMEN:—In regard to the test of a six-cylinder Packard motor by the Automobile Club of America recently, in the official results as published by the technical committee they make the veiled announcement that your oil was used during the first part of the test and Polarine in the latter part. Ordinarily this would not make any particular difference, but since they published the oil consumption in round figures it enters very largely into the published reports.

If you will pardon the liberty, I will present you with some of the facts taken from the report that may interest you.

First 150 hours of test, total fuel consumption was 4626.8 lbs.

Second 150 hours of test, total fuel consumption was 4367.3 lbs.

First 150 hours of test, average horsepower developed was 39.66 per hour.

Second 150 hours of test, average horsepower developed was 34.55 per hour.

First 150 hours, 10,845,000 revolutions were made.

Second 150 hours, 10,890,000 revolutions were made.

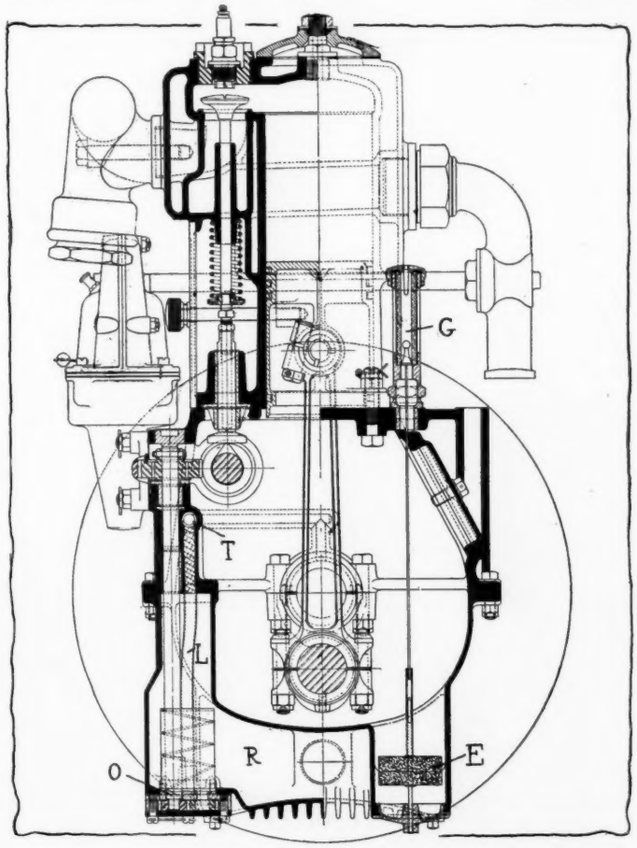
Now from the above figures you can see that there is something radically wrong. Less fuel was used but there were 45,000 more revolutions, equal to 11,250 intake strokes, and less horsepower generated; it still leaves a question in doubt, namely, wasn't some of the lubricating oil consumed as fuel by supplying too much and letting it work up past the rings?

From these figures quoted above you can see that your oil gave the best results, but from the report of the committee, which takes pains to state that the oil was changed, gives the impression that your oil wasn't satisfactory.

You are no doubt aware of the enormous oil consumption—1.07 gallons per hour.

I think it is up to your company to insist that the hourly consumption be given in print, preferably in one of the leading automobile magazines.

I am not a user of either oil, but I like to see things done on the square. In a previous test the howl was set up that the regular carbureter wasn't used. This time it seems that they mean to infer that the oil wasn't right. INTERESTED.



Cross-section through motor of Kelly-Springfield truck, showing the system of lubrication. This is a combination of forced feed and splash, but it differs from the usual type in that no oil is actually lifted by the big end of the connecting-rod. The oil is held in a special reservoir R

Motometer Indicated Correct Boiling Point

Pile of Steel Chips Burn with Persistence

NEW YORK CITY, Editor THE AUTOMOBILE:—In the issue of July 17 in connection with the account of the Indiana-Pacific Tour, the following item appeared "By the time the cars had reached the top of Floyd Hill, 30 miles out, the grade, combined with the altitude had the radiators boiling, *although* the Motometers showed a temperature of only 18 (probably a typographical error for 185) degrees in the cooling water."

This statement is rather ambiguous. It is quite possible that your correspondent desired to convey the idea of extreme altitude, but in expressing same it might appear to your readers that the Motometer was inaccurate. We therefore beg to call your attention to the directions issued with all Boyce Motometers. "In operating this instrument in altitudes above sea level it should be noted that an allowance of 2 degrees should be deducted for each 1,000 feet in altitude, thus at an altitude of 10,000 feet, the boiling point of water becomes approximately 190 degrees instead of 212 (sea level boiling point).

As the altitude of Floyds Hill is about 12,000 feet, we think this explains the apparent discrepancy. This is not only true of the Motometer, but true of all thermometers, and as every Boyce Motometer undergoes the most careful test at the Taylor Instrument Companies before shipping, the boiling point as recorded is absolutely correct. This point is always indicated when steam is produced in the radiator. However, we beg to call attention to the fact that the Motometer does not employ a submerged bulb and that therefore the temperature before steam is produced is always slightly cooler than the water at the top of the radiator. We have found this method of construction of the only practical means of indicating the average temperature of the whole radiator. Also with a submerged bulb it is impossible to note any perceptible rise in temperature between 200 degrees, a good operating temperature, and 212, steaming, a dangerous operating temperature. Incidentally wtih a submerged bulb the Motometer does not act as a low water alarm for if the radiator leaks leaving the bulb suddenly exposed to the air, the instrument would record improved cooling conditions when the reverse is actually taking place.

GEORGE H. TOWNSEND II, President The Motometer Co., Inc.

Vanadium Iron for Motor Cylinders

PITTSBURGH, PA. Editor THE AUTOMOBILE:—Interesting results after tests on the higher wearing qualities of vanadium cast iron motor cylinders as compared with ordinary grey iron is furnished by the results of severe service rims made by the manufacturers of one of the leading high-class American cars.

This car has a very extensive sale in many of the Western states, where the country is very sandy. In these sections, due to the extreme conditions, excessive wear of cylinders is a source of a great deal of trouble common to all cars.

With a view of trying out vanadium cast iron as a solution of the problem, these manufacturers somewhat over a year ago equipped a number of their cars running in the worst sections with cylinders of that type of iron.

Reports from two of the cars so equipped have recently been received and the cylinders show absolutely no measurable wear.

Ordinarily, grey iron cylinders require refitting with oversized piston rings after an equal length of service in the same section.

The tests were surrounded by no special conditions, but were of a strictly service character, the cars equipped with the vanadium cast iron cylinders being regular stock cars, used in ordinary, average service.

A comparison of the physical properties of the vanadium and regular cast iron is given in the following results of six tensile tests of each class of iron.

Test No.	Tensile Strength Lbs. Per Sq. In.	Brinell Hardness	Kind of Iron
V-1	21,100	159	Van.
V-2	20,825	157	Van.
V-3	21,050	162	Van.
V-4	20,975	161	Van.
V-5	21,875	160	Van.
V-6	22,025	157	Van.
R-7	19,050	139	Reg.
R-8	18,400	136	Reg.
R-9	18,500	127	Reg.
R-10	18,650	132	Reg.
R-11	19,150	132	Reg.
R-12	17,050	128	Reg.

The two classes of iron were identical in composition except for vanadium; as a comparison of the following chemical analysis shows:

Alloy	Regular Iron Per Cent.	Vanadium Iron Per Cent.
Carbon	3.27	3.28
Manganese	.53	.53
Silicon	2.86	2.69
Vanadium	None	.08
Phosphorus	.59	61
Sulphur	.096	.094

The vanadium iron shows an increase of 15 per cent. in maximum tensile strength and 20 per cent. in Brinell hardness number. Fractures showed about the same fineness of grain with a few larger crystals in the regular iron. In the color of the fracture, the vanadium iron was noticeably brighter.

In external appearance, the vanadium iron showed a somewhat greater luster on the machined surface.

E. W. STRONG, American Vanadium Co.

Putting Out an Iron Fire

PLAINFIELD, N. J. EDITOR THE AUTOMOBILE:—Pig iron under water has been described as a typically safe insurance risk, and to most persons iron or steel in any shape is equally free from liability to catch fire and burn up. Nevertheless, a recent experience with a big pile of steel chips which actually caught fire from a blazing rubbish heap near by shows that finely divided iron or steel may sometimes oxidize faster than it can get rid of its heat, and hence may exhibit all the phenomena of combustion.

Out in our yard we have a big heap of steel chips from the automatic turret and screw machines, which we sell from time to time in lots of several car loads. Steel being generally considered a non-combustible, this heap is quite close to the box lumber pile.

Saturday afternoon, August 2, the pile stood 8 feet high and contained several car loads, when the yard gang piled up alongside of it a lot of old barrels and rubbish and set fire to the latter. Of course, the steel pile got warm.

On going my rounds, to see that everything was in shape before going home, I discovered smoke and flame issuing from the supposedly fireproof heap, which at several points at the bottom glowed white hot. I called the fire department, which found a lively little volcano at work. They worked on that pile of chips for just an hour with two powerful streams.

S. W. RUSHMORE, Rushmore Dynamo Wks.

The Engineering Digest

An Equipment Developed by Special Body Builders To Fit Both Chassis and Customer—Lamps for Lofty Lighting Improved—Tests of Spring Suspensions and Tires in Germany Settle Doubtful Points—Another Shock Absorber

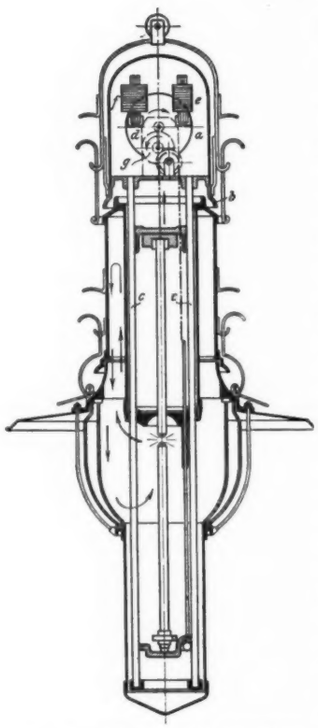


Fig. 1—Arc lamp for factories

LIGHTING of Automobile and Parts Factories.—In assembling rooms with overhead cranes and galleries, drop-forge establishments and other lofty indoor localities or in yards of factories, wherever it is of value, direct or indirect, to have a certain amount of light at all points as well as stronger nearby lighting where work is going on, electric arc lights are frequently employed, but the amount of attention which they require is considered an objectionable feature. Arc lamps of a new style, with which factory managers are not yet widely acquainted, obviate this drawback and are made for either alternating or direct current. Their economical superiority is derived from the long life of the carbons which is attained by means of their construction. One pair lasts for from 60 to 150 hours. The cost of maintenance is thereby reduced to from ½ to ¼ of the ordinary. Attention once a week, throughout a factory or a city where the system is adopted, is usually sufficient.

The Journal of the Society of German Engineers gives some information with regard to lamps of this class, which are made by the Körting & Mathiesen Co. at Leipzic, Germany. In the lamps arranged for direct current a pair of carbons lasts for about 50 to 80 hours and in those for alternating current for 100 to 150 hours. The candle power, on the other hand, reaches from 2,000 to 4,000 by direct, but only from 1,250 to 2,500 by alternating current, for the lower half of the globe. The specific current consumption is .22 watt per candlepower (German Hefner unit) for direct and .27 for alternating current, including the current used for the mechanical operation. The color of the light is white with a faint yellow tinge. The direct-current lamps operate with 42 volts and are placed with two in series in a 110 volt current and with four in series in a 220 current. The alternating current lamp is made for 40 volts for use in the same manner and also for 55 volts, the latter model going single in a 110 current, in series of two in a 165 current and in series of three in a 220 current.

The construction resembles that of the ordinary differential lamp for operation with refined carbons and is outlined in Fig. 1, in which the control mechanism shown is that used for alternating-current lamps. A plate *b* carries this mechanism *a* and the rods *c* for the carbon-holders. The regulation is accomplished by a motor disk *d* which swings between the poles of a magnet *e* in the main current and a magnet *f* in the lamp current and transmits its movements through the clockwork *g* to the carbon-holders. In the regulative mechanism for the direct-current lamps the elements employed are vertical solenoids and crank-arms.

The lamp frame consists of two parts: a metallic upper portion which is hung from the lamp plate and a lower portion, comprising the glass dome with upper and lower supports, and the two parts are tightly joined by eccentric clamps. Air is entirely excluded from the globe of the alternating lamps and is admitted only through a small hole to the direct-current carbons. The combustion-dust torn from the carbons lodges in the upper portion of the frame, scarcely any settlement taking place in the glass dome. The carbons used are of the variety prepared with strong addition of illumination-salts.

In connection with these lamps there is used a service signal which is held upright on top of the lamp plate and visible at a distance so long as the carbons have not been burned down to a certain limit, which can be predetermined by adjustment, but turns down horizontally when replacement is required. New carbons raise this signal automatically. The attendant need therefore not pull lamps down for inspection only.—From *Zeitschrift des Vereines Deutscher Ingenieure,* July 19.

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CARS Fitted to the Man.—In vehicles of the old persuasion—drawn by animals—the reins may be grasped long or short and held high or low and even at one side of the vehicle or at the other; at a pinch one can drive from the back seat or from the ground. These advantages have not yet been equalled in automobiles. Yet those among them which mean that drivers of very different stature and girth may drive a given vehicle with equal comfort, so far as their bodily relations to the driving-mechanism are concerned, are of sufficient importance to interest both makers and buyers of automobiles. The big man who drives his own car, always or occasionally, does not want a tight seat or cramped legs; he wants just the right distance from the steering crown and the armrests just so high that the hands fall naturally into position for leisurely guidance while leaving the elbow clear when the watchword is attention. Anything which the builder of select cars can do to cater to these and kindred individual requirements constitutes an advantage over the mass-producer whose output is marketed ready for touring and necessarily built to suit exactly only that average man who is nowhere to be found in the flesh.

Confronted with an increasing importation of excellent vehicles of the latter class and with widespread adoption of the principle of complete body and equipment for every car among competing manufacturers in their own country, those French makers who still adhere to the building of chassis alone and the body builders who deal directly with the purchasers of the chassis now love to dwell on the special advantages which may be accomplished by this arrangement. Methods which were kept secret before, in so far as possible, are now proclaimed. Thus descriptions are found of the means employed by Lamplugh and

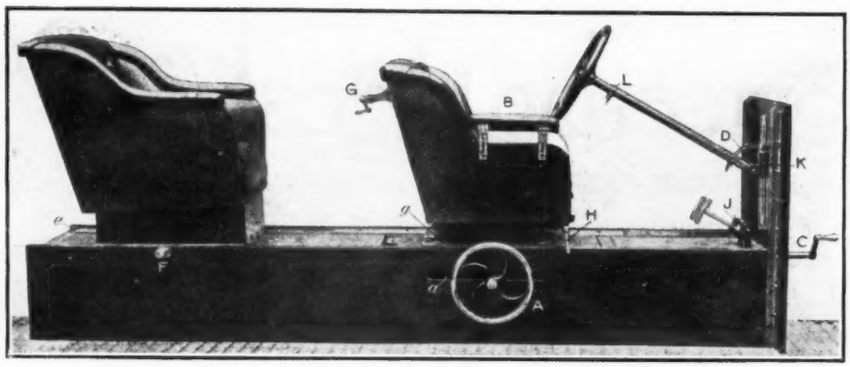

Fig. 2—Equipment enabling body builder to fit an owner-driver to his chassis

Rothschild, both celebrated body builders, for suiting their customers in the matter of making the driver's seat conform at the same time to the chassis which he has bought and to his personal stature. Fig. 2 shows the arrangements made for this purpose by the Rothschild firm. The principle is to have all those parts of a chassis whose position influences the question of comfortable seating and operation represented in the trial body and subject to such adjustments that the relations which they hold to each other in any given chassis can be duplicated and, in addition, to have a trial seat, also subject to a number of adjustments by means of which—and the co-operation of the customer—it can be determined just how this seat should be shaped, dimensioned and placed in order to give the maximum of satisfaction in combination with the chassis which has been selected.

As the position of the front seat has an effect which cannot be neglected with regard to the room left for the rear seat or the interior of a closed vehicle, the rear is also represented in the trial arrangement.

An explanation of the reference letters in Fig. 2 give the scope of the device. The height of the driver's seat proper is controlled by a worm operated through wheel A. The position chosen is secured by lock *g*. Slots *a* admit of lengthwise displacement of the spindle of wheel A. B represents the adjustable armrests. A worm by which the seat can be moved forward or backward can be operated by crank C. D is a quadrant for regulating the angle of the steering post. Both seats are arranged to slide in the guide grooves *e*. F is a lock for fixing the rear seat, G a crank for adjusting the reclining angle of the back of the driver's seat to a nicety. The angle of the seat itself is controlled by a worm and crank H. An apparatus for regulating the pedals to conform with the positions they occupy in the chassis is denoted by J. At K there is similarly indicated a device for raising or lowering the plate through which the steering post enters the dashboard, while the collar L serves to lock the steering post at any desired length.—From *Omnia*, July 26.

[It would perhaps be interesting to investigate the question whether anybody can determine, by such trial as is here referred to, the exact relations which will give a maximum of comfort in the long run, especially when, after all, some of the relations are determined by the proportions of the chassis and cannot be changed unless the builder of the chassis also adopts means for meeting the personal requirements.—Ed.]

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COMPREHENSIVE Tests to Develop Data for Improvements of Springs and Tires.—With an elaborate equipment at his disposal *Diplom-Ingenieur* Erich Bobeth of Hannover conducted during 1911 and 1912 an ambitious series of experiments dealing with the effects of spring and tire action in motor vehicles of all classes and aiming to produce data, not only on the efficiency of the power transmission taking place through these elements, but also, and mainly, on the suitability of the cushioning which they afford for the vehicle mechanism, passengers and loads. The effects of various types of shock absorbers and auxiliary springs were therefore also included in the investigations and form the subject of a long chapter in the book in which the results of all the experiments have now been laid before the public.

This work is published by M. Krayn Publishing Co., Berlin, W 57, and comprises 234 pages with 146 illustrations and diagrams and is sold for 10 mark ($2.50). The data which are recorded in it, in figures, curves and the inferences or conclusions drawn from the same, agree very largely with the trend of practical experience and industrial development, but here and there facts are placed in a light sharper than any which general experience has shed on the subject, and some details of importance contrast with common opinion and suggest new ideas. The painstaking presentation of all, or nearly all, of the mechanical factors involved cannot help but assist the reader to arrive at independent opinions in this difficult branch of automobile engineering. The testing equipment is of course described. Large extracts from the work are presented in *Der Motorwagen*, July 10 and 20.

Variable vehicle speeds, variable tire inflation, variable loads, variable dimensions and shapes of road obstructions, variable power transmission (as when brake action intervenes), variable flexibility of springs and the use of different shock absorbers combined to lend great variety to the tests.

The factors examined in the series dealing with variations of vehicle speed were: (1) The height to which the axle was raised above the normal, (2) the height to which the frame was raised, (3) the maximum vertical velocity of the axle due to spring oscillations, (4) the maximum vertical velocity of the frame, (5) the duration of the first compression stroke of the spring, (6) the duration of axle oscillations, (7) the duration of frame oscillations and (8) the amount of tire pressure or impact against the road at the end of the first spring rebound. It was shown that vehicle speed does not influence factors 6 and 7 and only slightly factor 5. In other words, after the first compression the duration of oscillations depends only upon the strength of the springs and upon the suspended and unsuspended weights. When, by increased vehicle speed, the oscillations are amplified, so is likewise the force of the spring, and the duration of the oscillations remains the same. All the other factors are strongly affected by the vehicle speed, however. But the maximum oscillation of the axle is not reached at the highest speed; it depends upon the size of the obstruction causing the shock also. With a given obstacle it was found that the maximum oscillation, exceeding the height of the obstacle, was reached at a speed of 22 kilometers, while at 75 kilometers the oscillations measured less than half of the height of the obstacle. The wheels "hit the high spots only." The oscillations of the frame followed the same law as those of the axle. In bringing about this result the flexibility of the tire is the most important element; it is much more deeply indented at the higher speeds. The tire pressures against the road, factor 8, were found proportionate to the axle lifts, as could be expected, and consequently decreasing with the higher speed.

Variations of the tire inflation ranging from 2 to 8 atmospheric pressures left the duration of frame oscillations unchanged, but stronger inflation reduced the duration of axle oscillations while increasing axle and frame lift and leaving the duration, but not the amplitude, of the first compression, factor 5, unchanged.

The axle and frame lifts are much reduced by increased loads, which is explained by the larger mass to be moved. Bigger loads also reduce the duration of frame oscillations, while the duration of axle oscillations remains unchanged. The pressures measuring the impacts of tires with the road are but slightly increased as the reduced axle lift offsets the effect of the greater load. Altogether the experience that heavier load gives steadier

running for a given tire inflation, though a greater loss of efficiency in the transmission of power, was confirmed.

Summarizing some of the other demonstrations made, the author says in his book, page 228: "It can be safely said that the practice of using strong inflation of the tires for vehicles run mainly on smoothly paved streets or hard-surfaced roads and a softer inflation for traffic on rough roads is recommendable.

"It is furthermore clear in what direction efforts for improving tires and increasing their life should be made. The tires must be developed in such manner that they will endure flexions of the sidewalls better than has so far been the case. When this shall have been accomplished, it will be possible to reduce the inflation and yet hold those forces which deteriorate the tires within admissible limits, despite high vehicle speeds and weights. It is the business of tire makers to devise ways and means to this end. The possibilities of improvement in this direction cannot by any means be considered as exhausted. The inflations prescribed by the tire makers, it is observed, have in most instances been somewhat reduced of late, and this is a sign that the makers have already started on the road to improvement here indicated.

"The reduction of inflation has not been shown to constitute the only means for diminishing the forces hindering the axle lift to the detriment of the tires. These forces are reduced with the mass to be moved. Wheels, axle and other unsuspended parts should be held as light as possible. The chain-driven vehicle is in this respect superior. The important part played by a suitable flexibility in the spring suspension for toning down the resistances to axle lift has been commented upon; similarly the effects of a correct design of the power transmission. It should in this connection also be remembered that all jamming of joints, especially such as is frequently caused by an oblique position of the axle, does not only increase the resistance to spring action but also subjects the tires to considerable lateral strains. Aside from the vehicle springs and the power transmission it is however, above all, unsuitable shock absorbers which, according to the tests, subject the tires to the greatest stresses, by interposing a considerable resistance, in some cases, to the first compression of the spring."

And on page 224: "By these tests, the differences which exist between shaft-drive and chain-drive have been laid bare and have been expressed in definite and reliable measurements for the first time."

The author's conclusions with regard to shock absorbers are expressed about as follows, page 217: "The creation of a shock absorber suitable in every respect is of the greatest importance, for only the use of such an apparatus admits of employing the type of springs which according to the tests is the most favorable. Only when it is possible to produce the indispensable moderation of the oscillations by a separate device which always works in the same manner can the moderation arising from friction of the spring leaves and the joints of the transmission be dispensed with. And to dispense with it to the greatest possible degree means a great advantage, as friction from these sources never can be made subject to regulation in conformity with the changing requirements."

—

COMPLICATED Shock Absorbers.—A competent investigator finds attractive qualities in the Akam shock absorber, the construction of which is shown in Fig. 3. While the shocks received from holes in the road surface are notoriously worse than those received from humps and are not so well taken care of as the latter in the average moderating device, he finds that this new construction in practice takes care of both and that it does so mainly by virtue of incorporating a severe check upon the extension of the vehicle spring beyond the position occupied when it is at rest. Against this advantage stands the comparative complication of the device, which it shares with some other shock absorbers of recent origin in all of which the attempt to deal fully with the many different conditions which may arise on rough roads has gradually led to this result. The refinement of the devices is also of such specific nature, mechanically, that it should be investigated in each case whether the service rendered when the vehicle carries its average load can also be expected without need of special adjustment when the load is unusually light or heavy. Resistances determined by cam action are frequently faulty in this respect, and the investigator in this case does not hesitate to admit that no perfectly satisfactory device is yet in the market in France.

The Akam device is composed essentially of a cam B operatively connected with the wheel axle and guided by the flanges of two rollers, C and D, of which C has a fixed spindle and acts as an abutment along the straight side of the cam body while D is mounted in a forked piece M which can be moved horizontally against the resistance of a very strong spring L. The casing A for these parts is bolted to the frame reach S. The connection of the cam with the wheel axle includes the rod F pivoted in the casing at G and journaled, in parallelogram with the stem of the cam, in lever R which receives an up-and-down motion from the axle through the ball-and-socket joint TTP and the vertical rod Q, the latter at its lower end similarly jointed to a clip secured to the axle. The lower end of F is the slightly movable fulcrum for the oscillations of lever R, and the position of the pin E through the lower end of the cam piece is so chosen that the movement of the cam is reduced to about one-third of that of the axle, this being necessary to avoid encumbrance because the cam movement is rectilinear and not rotary as in most other devices.

The upper, long and strongly inclined portion of the cam checks the rebound after the moment when the other leaves cease to follow the main leaf. The straight-lined central portion, which is parallel with the back of the cam, permits all small oscillations to go unchecked. The short incline below the flat portion checks the beginning of the rebound following a strong compression of the vehicle spring, after first facilitating this compression somewhat, through the upward pressure of spring L upon the inclined portion. In the case of a hump to be surmounted, this addition to the flexibility of the vehicle spring is an advantage, as the shock is reduced in proportion, but when the wheel strikes the farther edge of a hole in the road, the value of the provision is more doubtful.

In order to adapt the apparatus to different vehicles with springs of different stiffness, or to roads of a different character, the tension of coil spring L may be adjusted by means of the nut N, the head of which is suitably scalloped, as specially shown in the illustration, to give the hand a good grip.—From *La Vie Automobile*, July 26.

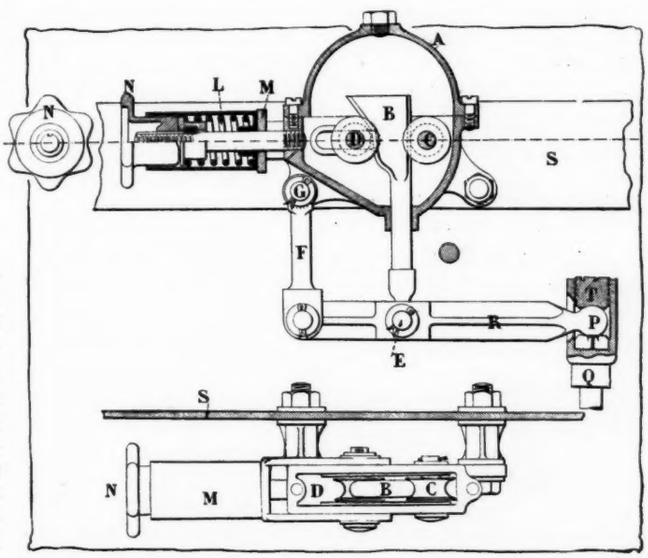

Fig. 3—One of the latest French shock absorbers

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The Contests of 1914

FRANCE and England are both looking ahead to a renewal of racing activities next season, and already both have tentatively announced their racing stipulations for their big road races. England is once more pinning her faith to standard, or as we know them, stock cars, with a limited piston displacement and with fuel limited, wheelbase limited, weight limited and body dimensions limited.

France, always a pioneer in racing rules, has set her mark a little beyond that of this year when she demonstrated to the satisfaction of all that fuel should be limited in a road race. For next season she will limit the number of tires a racer may use in the contest, and if any car exhausts its supply it will have to drop out of the race the same as it had to this year if it exhausted its fuel supply. Both of these are excellent stipulations. They are excellent because they are rational. The Frenchman is exhibiting commendable good judgment in his racing program. He is so framing his regulations as to make them valuable factors in determining future designs. The tire limitation will certainly turn the spot light on tire wear and if, for any reason, any tire maker puts forward an inferior article his own deeds will be on his own shoulders. Putting a limit on tires will bring a new factor of interest into racing in that it will surely demonstrate the difference of one car over another in tire wear; and, further, the part the driver plays in tire destruction.

Shaft-Driven Trucks

HISTORY is repeating itself. The stories of yesterday in the passenger car field are the stories of today in the motor truck realm. The questions that passenger car engineers solved 5 or 6 years ago are being resolved today by truck engineers. Truly it would seem that "our years are spent as a tale that is told," and yet it proves again that basic law of the world's development, namely, there is nothing new under the sun, but all novelty is merely an adaptation of the old to new conditions—old wine in new bottles.

Great Britain at least is in favor of enclosed drive for its trucks of all capacities. It is not settled as to what type of drive it will use, but it is cerain to be shaft with either worm, or some form of spur-bevel, double-reduction in the rear axle. The reasons for the general landslide toward enclosed rear drive are partly found in the preference of the war office, which a year ago instituted a subsidy scheme for this type, and since then makers have hastened to produce the approved type.

When turning the spotlight on our American industry it is rather curious why America, the home of the shaft-driven passenger car, should not be a leader in the shaft-driven truck. The more ready adaptation of chain drive has played its part in determining this preference, coupled with the fact that while with many the eventual design is not yet reached, it has been considered good manufacturing policy to use a form of axle that more readily lends itself to alterations in design than would a shaft-drive creation.

It is worthy of note that not a few of our American builders, who set out to create a truck irrespective of the design used in their passenger cars, adopted some form or other of shaft drive, and in nearly every case the truck was a unit design from radiator to rear axle.

There are still today many problems to be solved in shaft drive, chiefly when fitting it to large trucks where large gear reductions in the back axle are imperative. In this respect the flexibility of side-chain drive was an appetizing feature. With worm-driven axles good reductions are possible, but yet it is questionable if with the heaviest vehicles that may be produced if the required reductions will not encroach too much upon the axle clearance. Using the double-reduction axle gives a wide range of gear reduction and still leaves a high clearance.

American truck makers can take a few pages from the British engineer's pocket notebook in the matter of motor sizes, in that there has in the last 5 years been a perceptible reduction in motor bore and stroke and a very general increase in the use of four-speed gearboxes. The smaller motor, while giving a reduced cost of operation, affords sufficient power when coupled with the flexibility offered by a four-speed gearset.

In the gearset design there is a good lesson in the excedingly low gear ratio used on low speed, the vehicle speed not exceeding 2 miles per hour with the motor running at its maximum as determined by the governor. The low speed is used only to get the wheels turning when starting, and in the greatest exigencies; hence, low speed is purely an emergency one. Having low for this purpose the remaining three forward speeds give all the desired range of travel.

Cooper in Stutz Wins Santa Monica

Oldfield in Mercer Runs a Close Second—Rain at Libertyville—Isle-of-Man Rules Ready

LOS ANGELES, CAL., Aug. 11—*Special Telegram*—Earl Cooper in the Indianapolis speedway Stutz duplicated his Tacoma success by winning the Santa Monica road race Saturday, finishing the 445.2 miles in 6 hours, 1 minute and 52 seconds, being 5 minutes and 53 seconds ahead of Barney Oldfield, who drove a Mercer. Louis Nikrent in a smaller Mercer was third. There were in all seven money winners, the others being Verbeck in a Fiat, McConners in a Speedwell, Soules in a Cadillac and Beaudette in a Cadillac.

The winner averaged 73.77 miles per hour.

It was a hard-fought battle all the way, being a duel between Cooper and Oldfield from the start. With two laps to go Cooper had little better than a lap on his opponent, but a bad tire caused the Stutz to stop, and trouble was experienced making the changes. This was with one lap to go. Oldfield passed the stand on his next to the last lap, while the change was being made, and had covered 3 of the 8 miles before Cooper was again on his way.

Nikrent drove a consistent race throughout. Frank Goode in an Apperson was a good fourth, but was automatically disqualified for taking gasoline outside of the repair pits.

Lewis in a Stutz was the first to go out. He quit in the first lap. Opsahl cracked a cylinder and withdrew with his Buick, and Hanshue was forced out by a broken connecting rod. Morris in the Mercer also went out for the same reason. Tetzlaff in the Fiat made a disappointing showing. He broke a gasoline pipe, and as he had fallen back to eighth position in the twenty-third lap withdrew.

Hanshue in the Apperson was running in the eleventh lap when he had trouble. The others were all running at the finish.

Cooper was forced to stop in the first lap and Oldfield by circling the 8.5-mile course in 7:14 secured a good lead. Cooper cut this lead down and went to the front on the third lap. Tire trouble on the sixteenth lap enabled Oldfield to draw on even terms, they being tie at this position. In the next lap Oldfield led by 1 second, but that was his last time in front, as Cooper was never headed from there on. In the twentieth lap Cooper led by over 4 minutes. With half the race finished Oldfield had crept up again and was only 2 minutes and 30 seconds behind. For lap after lap these two fought it out with the Apperson and Mercer always within striking distance. At the end of the fortieth lap Cooper led by 2 minutes and 10 seconds. With fifty laps finished and only three to go, Cooper's lead was 3 minutes and 25 seconds. There were no accidents and the weather was perfect. The crowd was estimated at 75,000.

The summary follows:

Car	Driver	Time	Average speed miles per hour
Stutz	Earl Cooper	6:01:52	73.77
Mercer	Barney Oldfield	6:07:45	72.3
Mercer	Louis Nikrent	6:28:17	68.9
Fiat	Verbeck	6:24:50 (44 Laps)	...
Speedwell	McConners	6:28:31 (43 Laps)	...
Cadillac	Beaudette	.....	...
National	Siefert	.....	...

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Rain Spoils Libertyville Meet

CHICAGO, Aug. 11—Rain prevented the running of the second day of Alex Sloan's dirt track meet at Libertyville yesterday afternoon, but the card that was pulled off Saturday afternoon was interesting, despite the fact that the fields were small and the competition confined to the Cases, two Masons and a Mercer.

The Mason driven by Rickenbacher proved a general surprise by beating Disbrow in the Simplex Zip in the first heat of the 5-mile heat race, traveling the second mile in 54 seconds. Disbrow turned the tables in the second heat, but the race was not decided because of yesterday's postponement.

Eddie Hearne won a 5-mile local race, driving a Case; Rickenbacher took Endicott into camp in another 5-mile, while the 5-mile handicap went to Wilbur in a Mercer. Disbrow in the Simplex Zip won the mile time trial in :52.90, and turned a mile in :54.92 in the Jay-Eye-See. The meet will be completed next Sunday.

5 Miles, Limited to Local Cars

Car	Driver	Time
Case	Eddie Hearne..	5:43:05
Mercer	F. C. Wilbur..	.....

Exhibition Mile

Jay-Eye-See ...	Louis Disbrow..	54:40

10 Miles, 600 Cubic Inches

Mason	Rickenbacher..	9:07:11
Case	Bill Endicott..	.....

5 Miles, 300 Cubic Inches

Mason	Bill Chandler..	5:10:80
Case	Bill Endicott...	.....
Case	Ulhricht	....

5 Mile Handicap

Car	Driver	Time
Mason	Rickenbacher...	5:08
Case	Endicott	....

10 Miles, Second Heat

Simplex	Louis Disbrow.	9:44:50
Mason	Rickenbacher...	.....
Case	Endicott	.....

Time Trials, 1 Mile

Simplex Zip...	Disbrow	:52.90
Mason	Rickenbacher..	:54.75
Case	Endicott.....	:55.75

Free-for-All, 5 Miles

Mercer	Wilbur.....	4:44.75
Mason	Rickenbacher..	.....
Case	Ulbricht	.....

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R. A. C. Gives Out Isle-of-Man Rules

LONDON, July 31—The Royal Automobile Club has today announced conditions governing the 1914 International Trophy Race, which will be held in June on the Isle of Man course. The race will be a 2-day affair of approximately 600 miles and will be open to four-cylinder, internal combustion motors of 3,310 cubic centimeters piston displacement and a minimum weight of 2,800 pounds, which must include driver, mechanic and all other necessaries. The rules call for standard or stock cars, with a minimum wheelbase of 9 feet, minimum tread of 54 inches, minimum body width of 40 inches and the gasoline tank of 50 gallons capacity, sufficient for both days racing. The race permits of using any kind of fuel and a sample of the same in an 8-ounce bottle must be furnished to the club 14 days previous the race. The rules require the carrying of two spare wheels or detachable rims and the provision of one supply depot on the course.

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First Ohio Member of "200 Club"

TOLEDO, O., Aug. 9—B. M. Groenewold, of this city, became the first Ohio member of the 200 Club founded by E. C. Paterson. He made the trip from Toledo to Norwalk and return in his 2-year-old Overland Model 61, in 9 hours and 5 minutes on August 1. He thereby filled the requirement of making the 200-mile, non-engine stop run in from 9 to 10 hours, accompanied by an observer and without being held up for speeding.

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Elgin and Savannah Race News

CHICAGO, Aug. 11—Harry Grant, driving William Ziegler's Isotta, will be among the many stars who will drive at Elgin August 29-30, his telegraphic entry having been received today. Grant will be in the second day's race.

N. H. Van Sicklen, who is securing entries for the Savannah meet, announces that he has just received the Mercer nominations. De Palma and Wishart will be in three events, namely, the grand prix, Vanderbilt and Savannah Challenge races.

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Mears Finishes World Tour in Alco

NEW YORK CITY, Aug. 8—Ending a flying trip around the world faster than anybody ever traveled before, John Henry Mears made his final dash to New York in a high-powered six-cylinder Alco car. With all speed regulations suspended, Mears was driven at 60 miles an hour from the Grand Central Station to the finishing line. Mears arrived at the Grand Central Station at 10:10 P. M., and it was but four minutes before he was at his journey's end at Park Row.

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SEATTLE, WASH., Aug. 9—William I. Fitzerald, of this city, will manage the automobile meet at the Meadows on Sunday, September 14. Practically the entire entry list in the 100-mile Intercity race run on the Tacoma course will again compete on the Seattle track. Joe Thomas in the Ballard Special; Percy Barnes, Romano; Jack Welch in the Locomobile; Jim Parsons in Stutz; Cameron in a Stutz; Hansen in Hudson Special. Manager Fitzgerald has applied to the A. A. A. for sanction. The races will mark the close of the King County fair weeks.

Mercer Stars at Brighton Beach Race

De Palma Drives Winner— Large Crowd Attends Event— Three Accidents Thrill Spectators

NEW YORK, Aug. 9—The first track meet of the season conducted by the Motor Dealers Contest Association was held this afternoon on Brighton Beach track and an attendance of over 12,000, together with more than 1,000 automobiles parked around the track, demonstrated that the public interest in track racing still continues. The program of five events lacked interest in that there was not enough competition, all five events being won by Mercer entries, Ralph De Palma in the racer he drove at Indianapolis, winning in a walk-away fashion the four events he was entered in, and Spencer Wishart winning the fifth event. It was a Mercer field day from start to finish.

Two accidents, neither, fortunately, fatal, took place during the 25-mile Free-For-All. Jessop's National upset on the fourth turn and rolled over in the infield, due to throwing a tire. Both Jessop and his mechanic were badly shaken up. In the last lap of the race Hickman's Stutz, which had pursued the two Mercers hotly throughout the entire race, threw a tire on the second turn and ran into the sand bank on the outside of the course. Hickman was not injured. There was a third thriller during this race when LeCain, driving another Stutz, threw a tire on the third turn and turned completely around twice on the track without upsetting. After making the two circuits he drove his car into the paddock, but the steering gear connections were sprung and it was out of the remainder of the program.

A disappointment of the afternoon was the performance of the Peugeot racer recently piloted at Indianapolis by the late Zusarreli. Armor Ferguson was unable to keep the car running at any speed.

Owing to the lack of competition the time made was not what it might have been, and it was only in the handicap race that De Palma was forced to open up his big racer, when he showed circuits in 51 and 52 seconds.

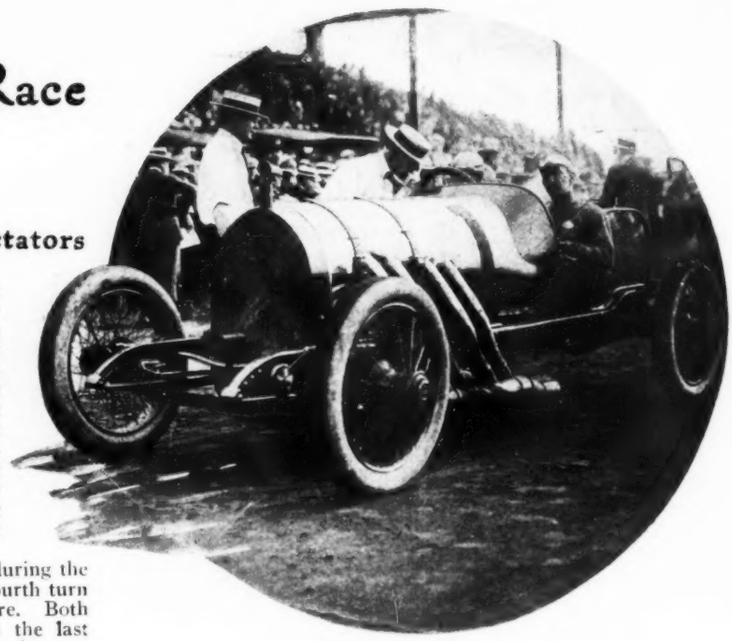
Wishart won the first event, Class C, non-stock for 10 miles, gaining almost a lap on the field, making it in 10:17 4/5.

The second event was won by De Palma. Hickman's Stutz ran a close second.

Event three went to De Palma, with Wishart second and Ferguson, in a Mercer, third. This was a 5-mile race, under 600 cubic inches. Time was 5:08.

The second 25-mile race went to De Palma, who made it in 24:46 4/5. Ferguson's Peugeot started, but withdrew on account of repairs. De Palma seemed to have things all to himself in this event and finished easily ahead of Wishart, who came in second, and Mulford, in a Mason, third.

A free-for-all handicap was carded for the last event, with De Palma at the post of honor. Wishart, in the other Mercer, had a handicap of 20 seconds; Ferguson, with a Mercer, had 30 seconds; Mulford, in his Mason, had 40 seconds; Matthews, in a Mercer, had 45 seconds, and Roberts, in a Roberts Special, was the limit man with 55 seconds. Wishart showed the way until the ninth mile, when De Palma passed him, finally finishing about 60 yards in front of Wishart's Mercer. The time was 10:25 2/5.



De Palma in winning Mercer

Event No. 1
231-300 Cubic Inches. 10 Miles

Car	Driver	Time
Mercer	Wishart	10:17 4/5
Mercer	Ferguson	..
Mercer	Metzner	..

Winning speed 58.38 miles per hour

Event No. 2
301-450 Cubic Inches. 10 Miles

Mercer	De Palma	10:10
Stutz	Hickman	..

Winning speed 59.05 miles per hour

Event No. 3
Under 600 Cubic Inches. 5 Miles

Mercer	De Palma	5:8
Mercer	Wishart	..
Mercer	Ferguson	..

Winning speed 58.47 miles per hour

Event No. 4
Free-for-All. 25 Miles

Car	Driver	Time
Mercer	De Palma	24:35 4/5
Mercer	Wishart	..
Stutz	LeCain	..

Winning speed 61.02 miles per hour

Event No. 5
Free-for-All. 25 Miles

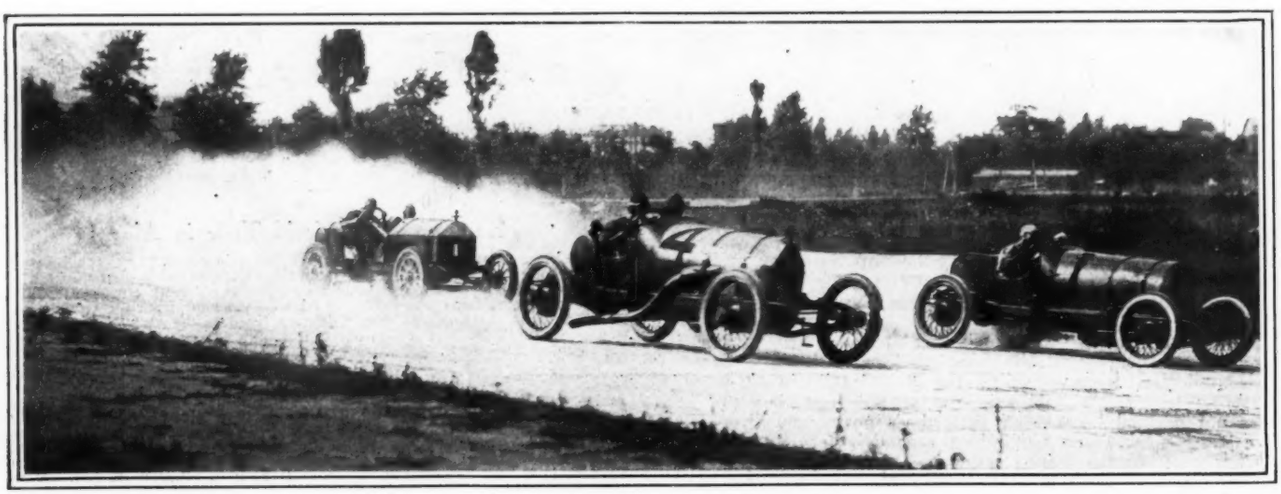
Mercer	De Palma	24:46 4/5
Mercer	Wishart	..
Mason	Mulford	..

Winning speed 60.5 miles per hour

Event No. 6
Free-for-All Handicap. 10 Miles

Mercer	De Palma	10:25 4/5
Mercer	Wishart	..
Mason	Mulford	..

Winning speed 57.5 miles per hour



De Palma leading Wishart and Hickman in the 25-mile non-stock free-for-all

Herff-Brook Handles Marathon Output

Selling Concern Incorporated in Tennessee to Establish Agencies—Refuses to Sanction Wisconsin Run

INDIANAPOLIS, IND., Aug. 12—*Special Telegram*—The Herff-Brook Corp., a new organization to handle the output of the Marathon Motor Works, Nashville, Tenn., was incorporated today with a capital of $100,000. This concern will maintain offices in this city, and will control the sale of Marathon cars throughout the United States and will establish branch agencies in foreign countries.

According to the present plans of the incorporators eight men will be at once placed in the field for the purpose of organizing agencies and the export business will be immediately placed in competent hands.

The officers of the Herff-Brook Corp. are: President, Jacob Herff; vice-president, Herbert Herff; treasurer, George Herff; secretary and sales manager, H. H. Brook, who has been with the Marathon company for several years in the capacity of general sales manager. All of these officials are old men in the motor-car business. Treasurer George Herff has been manager of the State Auto Co. for 5 years and with him has been associated his brother Herbert in handling Marathon cars locally.

Wisconsin Run Indefinitely Postponed

MILWAUKEE, WIS., Aug. 11—The fourth annual Wisconsin State Automobile Association reliability tour, scheduled for August 25 to 29, was indefinitely postponed on Saturday because of the refusal of the A. A. A. to grant a sanction for the event. The situation is a unique one and is liable to stir up a hornet's nest among Wisconsin motorists.

The W. S. A. A. planned this year's tour as a grade 1 tour for stock cars, with preliminary and final technical examinations, motor, clutch and brake tests, etc. Chairman Schmipf of the A. A. A. contest board found himself in a peculiar situation, however, when application for the sanction was filed. No manufacturers have filed stock car specifications with A. A. A. contest board this year.

As Wisconsin dealers insisted that the run be a grade 1 event or nothing, and refused to be content with a grade 3 run, the W. S. A. A. requested the A. A. A. to grant the grade 1 sanction and permit the Badger body to pass upon the eligibility of entries in regard to compliance with the stock car rule. This the A. A. A. refused to do, and offered to sanction the run as a grade 3 event, but knowing the minds of its prospective entrants the W. S. A. A. was obliged to refuse a grade 3 sanction. The only alternative was to cancel the tour, which was done by indefinite postponement.

The first two W. S. A. A. tours were run under grade 1 rules as stock car contests, but in 1912 the tour was a grade 3 run. This was so easy for dealers that they asked for something with a stronger competitive feature, as before. Under the conditions, however, the A. A. A. did not see fit to issue the sanction and the run is off for this year, at least.

S.A.E. Section on Gearsets

DETROIT, MICH., Aug. 7—That the automobile engineer is now thoroughly awake to anything new which may tend to improve his car, no matter how skeptical he may appear to the salesman of a new device, was shown by the unusually large attendance of what might be called the older heads at the meeting of the Detroit section of the Society of Automobile Engineers tonight. The occasion of this turning out despite the hot weather was the first of a series of talks that will be given before the section on the subject of gear-shifting devices.

At this meeting W. O. Burford, of the Gray Pneumatic Gear Shift Car Co., explained the working of the Gray mechanism. This is a shifter which, as the name implies, uses the energy stored in compressed air for performing the gear shifting functions. The air is stored in seamless steel tanks by means of an engine-driven air pump. When placed at the back of the chassis an 11 by 33-inch tank is used, and where the tank is more conveniently placed under the body the dimensions are 7 by 48 inches. The tanks are tested to 600 pounds pressure per square inch, which gives an enormous factor of safety, for it has been found that the shifter works with good results at 50 to 100 pounds air pressure. Mr. Burford stated that he had satisfactory operation with an air pressure as low as 25 pounds and as high as 300 pounds per square inch.

In order that a shifter may be foolproof it must be impossible to engage a different set of gears while the clutch is engaged. For this reason the air-control valve is connected to the clutch. Thus not only shifting of gears under load is prevented, but the shifting function is performed with the act of taking off the load, that is, the gears shift when the clutch pedal is depressed. A feature of the device is that the first function carried out upon the admission of the air is to always bring the gears to neutral before bringing those gears which are next desired into mesh.

Just what pair of gears will be meshed directly following the jump to neutral is governed by the position of the short lever on the quadrant below the steering wheel. It is obvious that if this lever is at the neutral point no gears will be remeshed. In order to protect the driver from making a serious mistake the reverse position of the locating lever can only be reached by pressing the button in the end of the handle. This act is not necessary for the forward speed positions.

A great advantage over the usual method of hand shifting which has been noted by the makers of this pneumatic shifter is the entire absence of the clashing of the gears upon any occasion when a car is in proper running condition.

After a general explanation and demonstration of the mechanism which was set up in working order before the audience, the talk took the form of answers to questions by the members. It was brought out in the discussion that the shifter had worked equally well in suummer and in winter during 29,000 miles of driving by Mr. Gray. Part of the tests were carried out in Wisconsin, at a time when the thermometer dropped to 37 degrees below zero Fahrenheit.

Up to the present time the largest part of the output has been used for attaching to cars already in the hands of owners. For this reason the shifter has been made so that it can be placed either in front or behind the gearbox. Although the mechanism itself now weighs but 28 pounds, this weight can be reduced where it is built into the original product, and the features for universal application to old cars can be left out. On the present model the piston diameter is 2 inches and the total stroke is 1 1/16 inches. The object of furnishing tanks of the large sizes quoted above is to allow for the operation of a Thurber starter, which is very often combined with the shifter. The total equipment in this case, including the tank, empty, then weighs 128 pounds.

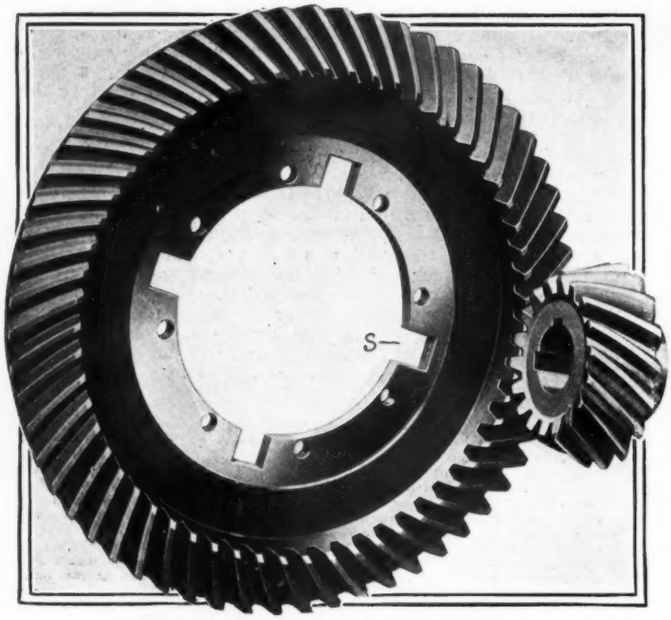
Mr. Burford also brought out the points that a composition including some rubber in its make-up had been found to be the only satisfactory material for valve seats that would be air tight. This was confirmed by others present who have had experience with the use of compressed air.

In relation to the air compression phase of the subject Mr. Thurber threw some light on air pumps with which he has had considerable experience in developing his rotary starter.

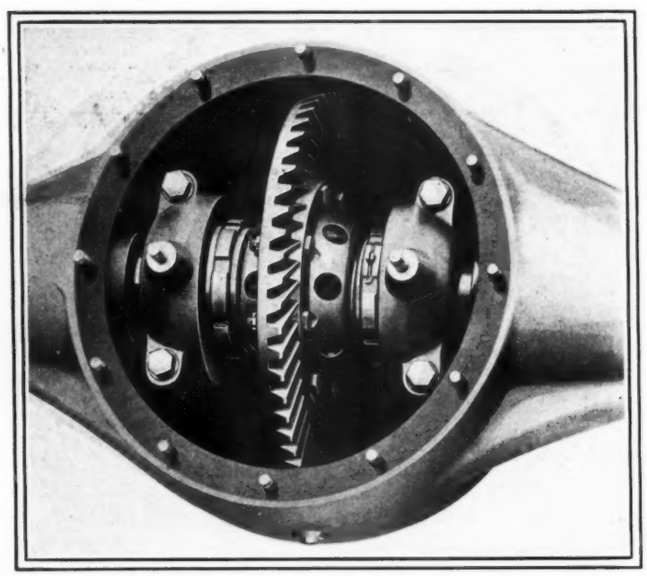
For the second part of the program David F. Graham spoke on the practical methods of determining ball and roller bearing sizes. The great majority of ball and roller bearings come in what are known as the annular or more properly, millimeter sizes. The standard dimensions were fixed by the European makers before the automobile became a reality, and it is because of the great number of foreign-made bearings that are used in this country that American makers have also adopted the same ratings. In this system there are three sets of sizes for light, medium and heavy loads, which are known as the 200, 300 and 400 series respectively. The size of the bearing is determined by its bore and above the number five this bore in millimeters is equal to the last figure multiplied by 5. Thus the 207, 307 and 407 all have a bore of 35 millimeters, but are of different load-carrying capacities.

In speaking of the proper bearing sizes to be used, Mr. Graham stated

A fair estimate of the number of spectators and automobiles at the Brighton Beach Races.



Packard skew bevel as it appears in mesh



Assembled view of new Packard gear on axle

that it was largely the necessary shaft or spindle dimensions in the case that determined the bore of bearing, rather than a theoretical calculation of the capacity of the balls. In cases where the shaft is large for other reasons than the load imposed by the particular bearing under consideration the light series is used, while if the bearing is to take all the load that the shaft itself will stand, the heavy series size that will just fit is usually sufficient without making the shaft unduly large for the sake of a larger bearing.

Prest-O-Lite Status Explained

NEW YORK CITY, July 14—The status of the Prest-O-Lite Co., Inc., was explained by the attorneys of the corporation, Winter & Winter, of this city today. A member of the law firm mentioned stated that the Prest-O-Lite firm is now incorporated under the new New York non-par value incorporation law and does include the original company which was incorporated by Fischer & Allison, of Indianapolis, under the Indiana laws in 1904.

The transfer of the incorporation from Indiana to New York state—the Indiana concern is now in the stage of dissolution—is a matter which in no wise interferes with the company's former or future business and tendencies, but is purely formal. All the organization remains unchanged.

When the company was then incorporated, its official capital was stated at $10,000. With a rapidly growing concern such a fixed par capital is of obvious disadvantages, as the values of the stock shares fluctuate and may also be manipulated to the disadvantage of the stockholders. Recognizing this, the State of New York was first in creating a law which makes possible the incorporation of a company without stating capital, but simply with a statement of the number of shares given out, among the holders of which the property value is distributed. If new capital is required additional stock may be given out with the consent of a stockholder majority, or a bonded indebtedness may be resorted to.

New Packard Bevel Gear

New Activities in Chevrolet, Ford and Case Factories

DETROIT, AUGUST 12—The Packard Motor Car Co. has for several months been fitting a new type of gearing in the rear axles of its passenger cars, the design being known as the worm-bevel, in which the standard shape of pinion and bevel gear are used but the teeth on each cut at an angle as in a worm gearing.

It was during the recent exhibit of the British and American engineers at the Packard factory when this new type of rear axle was shown, although the company had been using it for sometime in its machines. This worm-bevel has been introduced to give increased quietness which it accomplishes in that back lash, or looseness between the teeth, is entirely eliminated by this design of angular tooth.

There is still another merit to the worm-bevel in that with the straight bevel contact is limited to a line whereas with the worm-bevel with the curved teeth one set of teeth is constantly meshing while the next set is becoming disengaged thus affording a continuous contact in the same respect that it is accomplished with worm drive although not to the same extent. With the worm-bevel there is a sliding action between the teeth of the pinion and the belt.

In its course of manufacture the worm-bevel is given careful treatment. Care is first taken to avoid overheating in the forging process. The blank for the gear is then annealed. When the machining processes begin the large opening in the center for the differential casing is formed on a lathe. This is followed by cutting the slots for the spider on the milling machine a limit of one-half of one-thousandth inch being allowed in this work. An inspection follows after which the outside diameter is roughly turned followed by a finished turn together with turning the back angle and sizing the width of the tooth plane. This is next followed by cutting the circle of teeth which is followed by case hardening.

After this stage of manufacture is completed it is tested by the scleroscope and following this the holes for the casing bolts are drilled and reamed. The final test consists in testing the gear with a master pinion on a special fixture. The manufacture of the pinion is carried on with the same care as that of a large worm-bevel gear.

Rush Chevrolet Removal to Flint

DETROIT, MICH., Aug. 11—All the rolling stock from the Detroit plant of the Chevrolet Motor Co. was driven overland in the process of moving the factory equipment to Flint. Considerable of the furnishings were carried at the same time, although the complete removal will probably not be completed before Sept. 1. The old Imperial Wheel plant at Flint is being rapidly put in shape and will in the future be called Chevrolet plant No. 2. The factory formerly known as the Little Motor Car Co. plant will in the future be called Chevrolet plant No. 1. In this plant will be housed the executive, purchasing, and sales departments, and W. C. Durant, Pres.; A. B. C. Hardy, General Manager, and T. S. Johnson, Sales Manager, will have their offices there.

Ford Factory in Minneapolis Under Construction

MINNEAPOLIS, MINN., Aug. 11—To be completed in 268 days, the eleven-story, reinforced concrete building is to be erected at a cost of $600,000 which the Ford Motor Co. has planned some time as a northwestern assembling plant. Work began Aug. 11 and the building is to be turned over Jan. 23, 1914. The building will be 150 by 200 feet. A loading platform covered for 340 feet on Great Northern Railway trackage will accommodate seven freight cars. The equipment of the plant will cost $200,000. The facing will be red pressed brick on four sides with cream terra cotta trimmings.

Case Extends Racine Works

RACINE, WIS., Aug. 11—The J. I. Case Threshing Machine Co. is equipping its new South works at Lakeside, Racine, consisting of a foundry and machine shop costing in excess of $1,250,000, and will be ready for operations about August 15. A power plant, 112 by 115 feet in size, is now being built. The drive will be electric throughout. Considerable of the company's motor car work will be done in the new works.

Wisconsin Has 32,000 Automobiles

MILWAUKEE, WIS., Aug. 9—One motor car for every eighty-five inhabitants of Wisconsin is the record the Badger state shows at this time, and as the rush for licenses continues unabatedly, there is every reason to expect the ratio to be even closer by the end of the year. The 30,000 mark was passed some weeks ago, and license No. 32,000 was issued on July 25. The motor registry department of the Secretary of State's office, which has a fiscal year beginning July 1, has issued a comparative statement of license issues since registration and licensing was first required, showing a remarkable growth in the number of cars in use. Pursuant to an act of the Legislature of 1905, the registry was begun July 1, 1905.

Hudson Declares Dividend

Michigan Outlook Good—Walpole Trouble Creates Stir—General Motors Pays

DETROIT, Mich., Aug. 9—The board of directors of the Hudson Motor Car Co. held its meeting here on August 6 and declared a 100 per cent. stock dividend on all Hudson stock held at present. In addition to this demonstration of the company's prosperous condition, the sum of $250,000 was placed into the surplus account.

During the fiscal year ending July 1, the business of the company totaled $10,500,000 gross, which is $3,500,000 more than during the previous 12 months. The company's annual report shows that there is no bonded indebtedness whatever.

The new Hudson car, which was described in the August 7 issue of THE AUTOMOBILE, is now being shipped at the rate of thirty cars a day. It will be remembered that in announcing the 1914 type, the Hudson company has given up entirely the manufacture of four-cylinder models and devoted all its facilities to the production of sixes.

Michigan Buggy Outlook Is Hopeful

GRAND RAPIDS, MICH., Aug. 9—According to the petition in bankruptcy filed against the Michigan Buggy Co., Kalamazoo, by Salzburger & Sons Co., Chicago, and the First National Bank, Cleveland, which resulted in the appointment of the Detroit Trust Co. as receiver by Judge Sessions, the liabilities of the company are placed at $1,600,000, a large portion of this alleged indebtedness being in the form of commercial paper or unsecured promissory notes. It is declared that a number of Chicago and Detroit banks, as well as several banks in the east, are holders of the paper. The assets are said to be about $2,000,000. Salzburger & Sons Co. claim an indebtedness of $8,483.44, while the bank claims $2,393.70. The petition alleges that the gross business of the company in 1912 was $6,000,000. It is said if the business is carefully handled and continued until a sale as a growing concern can be made the creditors will lose nothing. The bond of the receiver has been fixed at $50,000. The company manufactures the Mighty Michigan car and other varieties of vehicles.

General Motors Again Pays Before Time

DETROIT, MICH., Aug. 11—The General Motors Co. has again anticipated the payment of its notes and has paid $1,000,000 to the Central Trust Co. on the amount which comes due October 1, 1913.

Owosso Town Wants Money Back

OWOSSO, MICH., Aug. 9—Mayor John H. Brandel has made a demand upon the Reliance Motor Truck Co., which recently abandoned its plant in this city and removed to Pontiac, for $25,000, originally raised by the city for park purposes, and later, he alleges, paid over to the company in the form of a bonus for the establishment of the plant here. He alleges the money was illegally paid by the Owosso Improvement Association to the company, and that unless the company complies with the terms of his communication, suit will be commenced to recover the amount.

Charge Capitol Trader with Embezzlement

WASHINGTON, D. C., Aug. 9—A sensation was created in the motor car trade of this city yesterday, when T. Oliver Probey, president of the Probey Co., Michigan agents, was arrested on the complaint of Edward Gerber and charged with embezzlement as a warehouseman. Probey is president of the Washington Automobile Dealers' Association and was chairman of the last show committee. According to Probey, the charge is a technical one and the merits of the matter are likely to be disclosed by a pending civil suit. In the meantime, on a writ of replevin, which he sued out, Gerber is trying to locate twelve of the twenty-six motor cars which Probey has hidden on the advice of counsel.

According to Probey, the cars were bought by him from the Michigan Buggy Co., which failed recently for $4,000,000. Probey says he gave notes in payment for the cars. These notes are said to have been discounted at a bank and the bank is holding the notes for payment on maturity.

The Pennsylvania Sales Co. is asserted by Gerber to have bought these same cars of the Michigan Buggy Co. and to have sold them to a trust company, which, in turn, sold them to a partnership consisting of Gerber and his wife. Gerber, on his writ of replevin, captured six of the cars, the ownership of which is in three-cornered dispute, but has been unable to locate the remaining twelve. Gerber's counsel has offered a reward of $250 for the recovery of the remaining cars.

Three Big London Taxi Firms Combine

LONDON, ENG., Aug. 4—A very important announcement has been made this week to the effect that three of the largest of the London taxicab companies have amalgamated. Of the 7,000 cabs licensed in London, 4,000 will in the future be controlled by a single company, and it is expected that a higher degree of efficiency will be the outcome of the change. The capital involved exceeds $5,000,000. The three companies who have amalgamated are the British, the General and the New Meter Cab companies. By degrees, all the cabs will be painted the familiar green color that the British company has adopted for all its cabs.

Walpole Receivership Much Disputed

BOSTON, MASS., Aug. 9—The financial affairs of the Walpole Tire & Rubber Co. came up again to-day before Judge Dodge in the United States District Court, when a hearing was granted on the petition of the trustees in bankruptcy of George A. Alden & Co., Boston, crude rubber dealers, who sought to have one or more additional receivers appointed to act with Robert C. Fisher, of New York. A large number of New York and Boston attorneys attended the hearing, but it could not be learned whether a majority of the creditors were in favor of continuing Mr. Fisher as the sole receiver or wanted others. Judge Dodge considered that the creditors of the Walpole company were well represented, there being something like $700,000 worth of claims having counsel. W. R. Sears, of Whipple, Sears & Ogden, of Boston, declared the present receiver incapable of handling the intricate affairs of the company, as his business career had not been successful, he having figured in bankruptcy proceedings against him and a marble company, of which he was the head in 1911. In view of the fact that Receiver Fisher of the Walpole company was appointed by Secretary McAdoo of the Treasury Department to act as the Government's representative for the Atlantic National Bank of Providence, which closed in April, Mr. Sears wrote Secretary McAdoo for any information he might have relative to the business ability of Mr. Fisher.

Louis D. Brandeis, who appeared as the representative of Secretary McAdoo and Comptroller of the Currency Kane, said he was authorized to say for Secretary McAdoo that he had known Mr. Fisher well and felt that he was entirely capable of handling the receivership of the Walpole company. T. H. Edmands, representing several creditors, and who formerly had business relations with Mr. Fisher at the time of the failure of the marble concern of which he was the head, spoke in his favor, declaring that the marble concern was obliged to go into bankruptcy solely on account of competition and that it was in no way due to bad management. Counsel for other creditors present, including Attorney Morris for the creditors' protective committee, were thoroughly satisfied with Mr. Fisher.

It was finally decided by counsel in the case to have a meeting in New York City next Wednesday of the creditors to vote as to what the court should order in the case. Then Judge Dodge will give another hearing on next Saturday, when he will determine what should be done on the petition as asked for by the George A. Alden Co. for additional receivers.

DETROIT, MICH., Aug. 11—Following the return to London of John Muir comes the announcement that the Hayes Wheel Co., of Jackson, Mich., will manufacture the shock-absorbing hub which was introduced by the inventor to the American trade. This hub contains a large number of balls, which distribute the road shocks before they are transmitted to the axle spindle.

CHARLOTTE, MICH., Aug. 9—At the annual meeting of the Duplex Power Car Co. the following directors were chosen: Frank P. Town, M. J. Lamson, Maurice Bolstrom, George A. Williams, Frank L. King, Horton H. Bryan and Truman Gillette. Mr. Town and Mr. Lamson were elected president and secretary, respectively.

NEW YORK CITY, Aug. 8—The Metropolitan section of the Society of Automobile Engineers held an outing at Rye Beach, N. Y., today and spent a very enjoyable time in the aquatic and land sports.

Group of Metropolitan engineers and families at Rye Beach

New Laws in Toledo

Car Owners Protected from Outside Interference—Detroit Safety Ordinances Passed—Short Measure Case

TOLEDO, O., Aug. 9—During the past week five new automobile laws passed during the last legislature have gone into effect. The most important of these laws is one designed to protect the car owner from outside interference and damage. The old law was ineffective in this matter, but under the new act, if the car is valued at more than $35, the law provides imprisonment in the penitentiary for not less than 1 year or more than 5, or confinement in the workhouse or county jail not to exceed 4 months, or a fine of not less than $100 or more than $500 or both; and if the value of the car is less than the mentioned sum, the fine is not less than $25 or more than $50.

Recognizing the fact that serious damage may be perpetrated without actually taking the car, the new law provides a penalty of imprisonment in the county jail or workhouse for not more than 6 nor less than 3 months or a fine of from $100 to $500 for any person who maliciously or with intent to steal, and without authority from the owner, "removes from any motor vehicle any portion of the running or steering gear, pump or any tire, rim, cover, clock, casing, radiator, fire extinguisher, tool, lamp, starter, battery, coil, spring, gas or oil tank, bell or any signal device, speedometer, license number, horn, box, basket, trunk or carrier, shield, hood, oiler, gauge, grease-cup, chain, lock nut, bracket, valve, bolt, rod, cap, screws, wire, spark-plug, carbureter, magneto, pipe, fan, belt, cylinder, switch brake, electric bulbs or any device, emblem or monogram thereon, or any attachment, fastening or other appurtenance, or any other part or parts attached to said motor vehicle which are necessary in the use, control, repair or operation thereof, or whoever knowingly buys, receives or has in his possession any of such articles or any part thereof, so unlawfully removed as aforesaid."

Should the culprit not desire to steal the car or any of its parts, but be prompted by motives of wilful destruction he will be cared for by the next section of the new law, which says that:

"Whoever purposely and without authority from the owner, shall start or cause to be started, the motor of any motor vehicle, or whoever purposely and maliciously shall shift or change the starting device or gears of a standing motor vehicle to a position other than that in which they were left by the owner or driver of said motor vehicle, or whoever shall purposely cut, mark, scratch or damage the chassis, running gear, body, sides, top, robe, covering or upholstering of a motor vehicle, the property of another, or shall purposely destroy any part thereof with liquid or other substance, or shall cut, mash, mark or in any other way destroy or damage" any of the numerous parts mentioned in the preceding section, "without the permission of the owner thereof, or whoever purposely shall drain or start the drainage of any radiator or oil tank upon a motor vehicle, without permission of the owner thereof, or whoever purposely shall put any metallic or other substance or liquid, in the radiator, carbureter, oil-tank, grease-cups, oilers, lamps, or machinery of a motor vehicle, with intent to injure or damage the same or impede the working of the machinery, or whoever shall maliciously tighten or loosen any bracket, bolt, wire, screw or other fastening on a motor vehicle, or whoever shall purposely release the brake upon a standing motor vehicle, with intent to injure said machine, shall, upon conviction thereof, be imprisoned in the work house or county jail not more than 3 months, nor less than 30 days, or fined not more than $100, nor less than $50."

Another law defines the duties of drivers on the highways, providing that each shall turn to the right and give half of the road, and in case the driver desires to pass a vehicle going in the same direction he "shall give an alarm or demand to the person or persons driving the vehicle in front and going in the same direction, of such desire, and the person so driving the front vehicle shall immediately give the half of the road to the rear vehicle, by turning to the right, so that the rear vehicle can pass to the left of the front vehicle." To enforce this rule a fine of not less than $1 nor more than $10 is provided for a violation.

The welfare of the general public is further safeguarded by a new enactment, which says:

"That it shall be a misdemeanor for any person to operate a motorcycle or motor vehicle of any kind upon any public highway or street while in a state of intoxication, and upon conviction he shall be subject to punishment by a fine of not less than $25 nor more than $100, or imprisonment in the county jail for not more than 6 months, or both."

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INDIANAPOLIS, IND., Aug. 9—The factory sales office which has been maintained in Indianapolis by the Maxwell Motor Co. has been discontinued and the district will be handled from Cleveland, O.

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INDIANAPOLIS, IND., Aug. 9—During the last 2 weeks in July almost 12,000 motor car licenses were issued by the Indiana Secretary of State. The new state law requiring an annual state license became effective July 1, but the tags were not received until 2 weeks later.

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Safety Automobile Ordinances in Detroit

DETROIT, MICH., Aug. 11—An ordinance which affects all vehicle traffic has recently been passed here, and it requires that no vehicle shall stand within 30 feet of any fire hydrant. Originally this was only effective within the 2-mile circle, but the Police Commissioner of the city is making efforts to have it enforced all over the city because the large automobile plants are now outside the limited zone. There is also a regulation in force keeping vehicles from in front of the theatre entrances.

To make the downtown district safer at the night-rush hour, vehicles are not allowed to stand at the curb between 5 and 6 p. m. in the business section of Woodward Ave. During these same hours, a space of 15 feet from the car tracks is marked off by portable posts bearing signs Safety Zone. Vehicle traffic is not allowed in this zone. With this new system the process of sending horse and motor traffic around the City Hall square has been discontinued.

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First Connecticut Short Measure Case

HARTFORD, CONN., Aug. 9—The first arrest and prosecution under the new Connecticut weights and measures law is that of Frederick S. Sperry, of Clinton, who is alleged by the state police to have acquired $20,000 in the past 8 or 9 years by selling gasolene at short measure. The accused was taken before Justice of the Peace Holcomb N. Jones and his case continued under bonds of $300. He is charged on three counts though it is expected many more will be preferred when the case comes to trial next week. Clinton residents allege that Sperry has been making $28 a day by leaving 90 gallons of gasolene when 100 gallons were ordered and disposing of this shortage to his friends. One of the beneficiaries of the scheme is said to be a garage in which Sperry is a part owner.

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NEW ORLEANS, LA., Aug. 9—Taxicab companies in this city are in arms against a new ordinance regulating fares and the operation of taxicabs. The principal objection is to the provision making a flat rate between the depots and docks and the hotels. The commissioner has refused to make any changes and the question is to be carried to the courts.

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To Test Ohio Horsepower Tax

COLUMBUS, O., Aug. 9—About September 1 a meeting of the three attorneys named by Charles C. Janes, president of the Ohio State Automobile Association, to test the constitutionality of the Warnes automobile law, will meet to lay out a plan of action. The new law, which provides for a graduated fee for registration of all motor vehicles, based upon their horsepower, does not become effective until January 1, 1914. Steps will probably be taken to enjoin the enforcement of the law in Columbus and possibly both Cincinnati and Cleveland. It is claimed that the law is unconstitutional because it provides for double taxation.

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CLEVELAND, O., Aug. 9—A meeting of the executive committee of the Ohio State Automobile Association was held to-day at the Hollenden Hotel, Cleveland, to lay out a plan of action for the coming fall and winter campaign.

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To Codify Ohio's Automobile Laws

COLUMBUS, O., Aug. 9—Governor Cox has named a commission to codify the road laws of the State of Ohio in order to do away with a number of inconsistencies. The codifying commission is to recommend changes in the laws also. The commission consists of William F. Stinch, Cleveland; A. H. Huston, Columbus; J. J. Hudson, Portsmouth; Thomas Mulcahy, of Napoleon, and W. A. Hite, of Tornville.

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SPRINGFIELD, O., Aug. 9—The City Council has adopted an ordinance providing for a complete set of traffic rules, made to govern the operation of all kinds of vehicles on the streets of the city. The traffic rules are similar to those in force in all of the large cities of the state.

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ST. PAUL, MINN., Aug. 11—Some action is expected at a special session of the Legislature in October to maintain the State automobile license work. The session is to be called for another purpose, but the last Legislature adjourned without provision for the department until the new law goes into effect in a year. The Secretary of State favors $5 a year tax, instead of $1.50 for three years as at present. This would add a large sum to the roads fund. Licenses are being issued at the rate of nearly 100 a day, there being 44,000 machines in the State; licenses were issued for 3,000 dealers, and it is believed at least 1,000 cars have not been licensed by their owners. Seventy-five per cent. of the new cars are said at the Secretary's office to be going into country districts.

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Test Road Finance Law

SEATTLE, WASH., Aug. 8—Application has been made by W. R. Booth, of Everett, Wash., to the Snohomish County Superior Court to grant an order restraining the County Auditor from issuing funds to the road contractors building the Snopualmie Pass highway. He makes the move in order to test the validity of the law prohibiting an expenditure of more than 80 per cent. of funds created by tax levy for road and bridge purposes. Under the new law Snohomish County has $63,000 in its fund for this work.

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Discover License Fraud in Bay State

BOSTON, MASS., Aug. 9—The Massachusetts Highway Commission has just begun an investigation through its inspectors of all the people holding dealer's licenses in the Bay State following the discovery of a plan to get cheaper registrations. The scheme was discovered by accident. Out in Winchendon, Mass., an inspector of the State Highway Commission, in going into the details of an accident in which a man was badly injured, discovered that in that town one man secured a dealer's license and thereby got five registration numbers for $25. These he parceled out to friends, and as a result the State was defrauded out of $40 a year in this one instance alone. The case has been going on for 4 years.

N. Y. Show Dates Fixed

One Show First Week in January to Be Held at Palace—Dealers Boycott Iowa Fair

NEW YORK, JULY 11—The Automobile Chamber of Commerce today announced the show dates for the 1914 automobile shows to be held in this city and also in Chicago. Only one New York show will be held and it is billed for the Grand Central Palace during the week of January 3 to 10. There will not be any show next year in the time-honored Madison Square Garden that has become known as the New York show center to so many motorists. There will be but one New York show and one week of it passenger car and accessories being shown simultaneously.

Four floors of the palace will be used to house the car and accessory exhibits and more space is available than was utilized in both Madison Square Garden and the palace at the shows last January. The four floors of the palace will give 50,000 additional square feet of show space. Cars will occupy the first and second floors and all of the wall space on the third and fourth floors.

Electric cars will have a special space provided in the wall space on the second floor and additional show sections on the same floor as may be needed.

The products of the Motor and Accessory Association members will occupy the third floor space not taken up by car exhibits and in addition 15,000 square feet of space on the fourth floor. The allotment of this space will be made through the Motor and Accessory Association.

It is expected that the Motorcycle Mfg. Association will exhibit through its members on the fourth floor.

Accessory manufacturers, who are not members of the Motor and Accessory Association, may secure space on the fourth floor.

The Chicago show will be held January 24-31 and the Coliseum and First Regiment armory will house the exhibits as formerly. Much additional exhibit space will be provided in the coliseum by building the gallery out and extending it 25 feet at each end. The aisle will extend around the inside of the balcony instead of around the outside as heretofore giving deeper exhibit spaces. Five thousand additional square feet of space will be added by this change.

Three-quarters of the main floor of the armory will be given over to the Electric Vehicle Association of America for the exhibit of electric vehicles as formerly.

Rental spaces will cost less than formerly and conducting all shows under one management is expected to save the industry many thousands of dollars. Application blanks and plans will be issued September 1. Commercial vehicles will not be exhibited as the makers decided they do not want truck shows. Both shows will be held by the Automobile Chamber of Commerce under the general management of S. A. Miles.

Des Moines Dealers Boycott State Fair

DES MOINES, IA., Aug. 9—The Des Moines Automobile Dealers' Association has declared a boycott on the automobile show to be held in connection with the Iowa State fair, the last week in August. Refusal of the fair officials to sell the dealers space at the same rate granted other exhibitors is the cause of the boycott.

To Build 600 Miles Texan Road

DEL RIO, TEX., Aug. 9—The movement that was recently inaugurated, to construct an automobile highway between San Antonio and El Paso via Del Rio and a number of other towns in the Rio Grande border region, is expected to take concrete shape at a general meeting of representatives of the communities and counties along the route to be held here August 20. The proposed road will be approximately 600 miles long and it will connect at El Paso with the borderland route that runs from that place to California.

JANESVILLE, WIS., Aug. 11—The Janesville Motor Co. of Janesville, Wis., has taken occupancy of its new garage at Main and Bluff streets, which cost $35,000 and is one of the largest and best equipped garages in Wisconsin, outside of Milwaukee. The building is 3 stories high, 255 by 95 feet in size.

MILWAUKEE, WIS., Aug. 11—The Sternberg Mfg. Co. of Milwaukee, Wis., builder of Sternberg commercial vehicles, has broken ground for a $50,000 addition to the large plant erected only three years ago at 46th avenue and Burnham street. The company has been cramped for room for some time and recently booked orders for trucks for American and South American use which make an enlargement of facilities necessary. It is hoped to complete the addition by October 1. The company will exactly double its working force and output of trucks when the addition is finished.

CHICAGO, Aug. 9—The south park commissioners have revoked the permit which turned Michigan avenue into a garage and have returned to the old order which allows cars to stand by the curb only 1 hour. This means that no longer will owners be permitted to park their cars in the center of the boulevard. Objection was made because this parking destroyed the beauty of the boulevard, many owners leaving their cars on the street all day.

Automobile Securities Quotations

A steady demand which led to an almost general increase of stock prices characterized this week's market. Gains ranged from fractions to 8 points, this latter record of rise being that of Firestone common.

	1912 Bid	1912 Asked	1913 Bid	1913 Asked
Ajax-Grieb Rubber Co., com	150	200	150	170
Ajax-Grieb Rubber Co., pfd	95	100	95	100
Aluminum Castings, pfd	..	..	97	100
American Locomotive Co., com	44½	45½	33¼	33½
American Locomotive Co., pfd	99	102	100¼	101
Chalmers Motor Company, com	..	..	105	115
Chalmers Motor Company, pfd	..	..	97	102
Consolidated Rubber Tire Co., com	13	16	21	21
Consolidated Rubber Tire Co., pfd	50	59	72	90
Firestone Tire & Rubber Co., com	273	276	270	280
Firestone Tire & Rubber Co., pfd	106½	..	103	105
Fisk Rubber Company, com	..	..	..	..
Fisk Rubber Company, pfd	..	..	..	..
Garford Company, preferred	99	101	92	96
General Motors Company, com	35	37	35½	37
General Motors Company, pfd	78	79	76	78½
B. F. Goodrich Company, com	72½	73	30	31½
B. F. Goodrich Company, pfd	107¼	108	90½	92
Goodyear Tire & Rubber Co., com	330	334	295	300
Goodyear Tire & Rubber Co., pfd	104¼	105¼	98½	99½
Hayes Manufacturing Company	..	97	..	..
International Motor Co., com	27½	28½	..	5
International Motor Co., pfd	84	85	10	18
Lozier Motor Company, com	..	..	16	18
Lozier Motor Company, pfd	..	..	..	90
Maxwell Motor Co., com	..	..	4	5
Maxwell Motor Co., 1st pfd	..	..	33	36
Maxwell Motor Co., 2nd pfd	..	..	10	11½
Miller Rubber Company	..	146	135	140
Packard Motor Company, pfd	105	107	..	97
Peerless Motor Company, com	..	..	30	40
Peerless Motor Company, pfd	..	..	85	92
Pope Manufacturing Company, com	37	40	9	11
Pope Manufacturing Company, pfd	74	75	38	42
Portage Rubber Co., com	..	..	35	45
Portage Rubber Co., pfd	..	..	..	90
Reo Motor Truck Company	9¾	10½	..	11
Reo Motor Car Company	21	24	..	18
Rubber Goods Mfg. Co., pfd	..	..	102	106
Studebaker Company, com	44	45	22	24½
Studebaker Company, pfd	97	99	80	86
Swinehart Tire Company	95	97	88	92
U. S. Rubber Co., com	..	..	60⅛	60⅞
U. S. Rubber Co., 1st pfd	..	..	104	104½
White Company, preferred	107½	..	104	108
Willys-Overland Co., com	..	..	59	62
Willys-Overland Co., pfd	..	..	85	90

Market Changes of the Week

Few changes occurred in this week's markets. Tin fluctuated throughout the week but closed at $41.75, its opening price, experiencing no change. There were freer offerings of spot tin for interior shipment and of future deliveries under the foreign limits, which were lower than on Monday. Both electrolytic and Lake coppers rose $0.005 per pound, there being small inquiries for electrolytic at the latter part of the week. Reports from the lake district continue to be encouraging for either a settlement of the strike or a resumption of work at the mines that are now partially idle. Lead was quiet and easier after a restless week, closing at no change in price. Bessemer and open-hearth steels both rose $0.50 per ton. Antimony remains constant at $0.075 per pound. Cottonseed oil had quite a sharp break in price on Tuesday, closing at a decline of $0.90 per barrel. Reports from the Middle West indicate a prosperous condition and trading is brisk.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Change
Antimony, lb	.07½	07½	07½	.07½	.07½	.07½	.....
Beams & Channels, 100 lbs	1.61	1.61	1.61	1.61	1.61	1.61	.....
Bessemer Steel, ton	26.50	27.00	27.00	27.00	27.00	27.00	+ .50
Copper, Elec., lb	.15⅛	.15¼	.15½	.15½	.15½	.15⅝	+ .00½
Copper, Lake, lb	.15¼	.15¼	.15½	.15½	.15½	.15¾	+ .00½
Cottonseed Oil, lb.	9.35	9.18	9.12	9.40	9.40	8.45	— .90
Cyanide Potash, lb.	.19	.19	.19	.19	.19	.19	.....
Fish Oil, Menhaden, Brown	.33	.33	.33	.33	.33	.33	.....
Gasoline, Auto, 200 gal	.22¼	.22¼	.22¼	.22¼	.22¼	.22¾	.....
Lard Oil, prime	.95	.95	.95	.95	.95	.95	.....
Lead, 100 lbs	4.50	4.55	4.55	4.55	4.55	4.50	.....
Linseed Oil	.50	.50	.51	.51	.51	.52	+ .02
Open-Hearth Steel, ton	26.50	27.00	27.00	27.00	27.00	27.00	+ .50
Petroleum, bbl., Kansas crude	.98	.98	.98	.98	.98	.98	.....
Petroleum, bbl., Pa., crude	2.50	2.50	2.50	2.50	2.50	2.50	.....
Rapeseed Oil, refined	.68	.68	.68	.68	.68	.68	.....
Silk, raw Italy	....	5.10	....	....	5.00	5.05	— .05
Silk, raw Japan	....	3.95	....	....	3.92½	4.05	+ .15
Sulphuric Acid, 60 Baume	.90	90	.90	.90	.90	.90	.....
Tin, 100 lb	41.75	41.50	41.65	41.65	41.65	41.75	.....
Tire, Scrap	.09½	.09½	.09½	.09½	.09½	.09½	.....

FOURTEEN Miles of Factory—When the General Vehicle Co. finally completes its plant on Borden avenue from Review to Bradley avenues in the Blissville section of Long Island City it will be the largest manufacturing concern in Queens and perhaps in all of Greater New York devoted to one general product—commercial motor vehicles. The company is now constructing of brick and steel the first of six great fireproof buildings or units that are to occupy the larger part of the tract of 10 acres which it owns. At least four of these units will be of the same size, six stories in height and measuring 100 by 500 feet on the ground. Each of these units will contain about 300,000 square feet of floor space. The two other six-story buildings, which will be of the same style of architecture as the other four but covering a somewhat smaller area, together with other units, will bring the total floor space up to over 1,500,000 square feet. In addition to these six buildings at lease two others are to be built, one as a substation and heating plant and the other as a timber dry kiln. As a graphic means of comparison the six main units, if their aggregate amount of floor space were spread out in one-story buildings, would cover 750 ordinary city lots, each measuring 20 by 100 feet. If these lots were laid end to end they would make a strip of territory 20 feet wide and over 14 miles long. There will be 7,500 men employed. Over $5,000,000 will be spent.

Kuhlman Car Co. Adding—The G. C. Kuhlman Car Mfg. Co., Cleveland, O., will erect additions to its plant.

Will Erect Gibsonburg Factory—The National Motor Truck Co., recently organized by Toledo, Lima and Gibsonburg, O., capitalists, will erect a factory in the latter city.

Builds Frisco Truck Plant—The Moreland Distillate Motor Truck Co., Los Angeles, Cal., has acquired a site at Fourth and Harrison streets, San Francisco, Cal., and will erect a plant for the manufacture of its distillate-burning motor truck.

Federal Enlarges Plant—The large addition to the plant of the Federal Motor Truck Co., Detroit, Mich., will increase the floor space 33 per cent. It will be ready for occupancy within 30 days. This increased space will afford an increase of 50 per cent. in the production.

Factory Burned; Loss $12,000—The plant of the Showalter Mfg. Co., maker of automobile bodies, housed in a frame building in Indianapolis, Ind., was recently destroyed by fire of unknown origin. The loss is estimated at approximately $12,000.

Negotiating for Reliance Plant—The Evansville Commercial Truck Co., Evansville, Ind., is negotiating for the plant recently vacated by the Reliance Truck Co. The matter has been referred to the industrial committee of the Owosso, Mich., Improvement Association.

Working on Pharis Plant—A large force of men is at work on the additions to the plant of the Pharis Tire & Rubber Co., which has its general offices in Columbus, O. One of the new buildings will be 100 by 73 feet and the other 22 by 40 feet.

Adds to L. I. Plot—The Ford Motor Co., Detroit, Mich., has bought from Ellen Trudden a plot 75 by 100 feet on Jackson avenue, Long Island City, adjoining a plot of the same size which it recently purchased from Mary Burke. This gives the company a frontage of over 400 feet on Jackson avenue at the corner of Honeywell street.

Champion Motor Car's Factory—The Champion M. C. Co. will have a factory in Minneapolis, Minn., at 14 avenue N. E. and the Northern Pacific tracks. It will employ thirty men. Six and four cylinder machines will be made. The six will be 50 horsepower and the four a 36. Wheels will be wood or wire. The price will be $2,750 and $1.800.

Lozier Rests a While—The Lozier Motor Co., Detroit, Mich., has had the wheels of its plant at rest for a few days while the machine equipment was being rearranged in order to give greater efficiency in getting out the large production planned for 1914. The assembling floor space has been doubled and the capacity from now on will be 25 Loziers a day.

Gray & Davis Get Another—In order to facilitate deliveries, Gray & Davis, of Boston, Mass., have purchased the Sprague-Waldo lamp plant on Harper avenue, Detroit, Mich., and will take possession September 1. This will give the Boston firm four large factories, two in Boston, one in Amesbury, Mass., which has just been enlarged one-third, and the new acquirement in Detroit.

Plans $75,000 Heinze Concern—Plans are being perfected for the organization of a $75,000 concern under the name of the Heinze Electric Co., Ltd., of Canada. The parent company at Lowell, Mass., is the manufacturer of electrical apparatus, and makes spark coils for the Ford Motor Co., Detroit, Mich. The new company is being created for the purpose of furnishing coils to the Canadian Ford factory, and will be established in Walkerville, Ont.

Pontiac Company Breaks Ground—The Pontiac Motor Castings Co., Pontiac, Mich., has broken ground for an addition, 50 by 60 feet, to its present factory. The addition will be of uniform construction with the main building and will be completed by September 1. It will be used for the manufacture of gray iron castings. The company has enjoyed a good business this year and has already booked a number of orders for 1914.

New Department at Moon Factory—With the new latest additions to the plant of the Moon M. C. Co., Main and Cornelia streets, St. Louis, Mo., a complete agency, sales and show room, as well as a large service station, exclusive for the St. Louis customers, has been opened. All sales agencies that have been maintained throughout the city heretofore have been abandoned and will be concentrated in the factory agency and directly under the supervision of the management of the parent company.

The Automobile Calendar

Shows, Conventions, Etc.

Sept. 17-18..... Cleveland, O., Annual Meeting of the National Brick Manufacturers Assn.
October 13.....Philadelphia, Pa., National Fire Prevention Conference. Philadelphia Fire Prevention Commission.
Oct. 27-28.....Chicago, Ill., Convention of Electric Vehicle Association of America.
Dec. 9-12.....Philadelphia, Pa., Annual Convention of American Road Builders' Association.
Dec. 11-20.....New York City, First International Exposition of Safety and Sanitation, under the auspices of the American Museum of Safety.

Race Meets, Runs, Hill Climbs, Etc.

Aug. 15-16.....Denver, Colo., Track Race.
Aug. 18-20.....Milwaukee, Wis., Fourth Annual Wisconsin Reliability Tour, under the auspices of the Wisconsin State Automobile Assn.
Aug. 25-28.....Houston, Tex., Reliability Run, Houston Auto Club.
Aug. 25-30.....Cleveland, O., Midsummer Show, Forest City Fair, Cleveland Automobile Show Co.
Aug. 29-30.....Elgin, Ill., Elgin Road Races, Elgin Road Race Assn.
Aug. 30-Sept. 6.....Chicago, Ill., Reliability Run, Chicago Motor Club.
September .....Grand Rapids, Mich., Tour, Grand Rapids Auto Club.
Sept. 1.....Columbus, O., 200-Mile Track Race, Columbus Automobile Club.
Sept. 8-13.....Chicago, Ill., Around Lake Michigan Run, Chicago Motor Co.
Sept. 9.....Corona, Cal., Track Race, Corona Automobile Assn.
Sept. 12.....Canfield, O., Track Meeting, Canfield Fair Assn.
Sept. 13.....Covington, Ky., Track Meeting, Cincinnati Automobile Club.
Sept. 13.....Grand Rapids, Mich., Track Races, Grand Rapids Automobile Club.
Sept. 20-21.....Detroit, Mich., Track Races, Michigan State Fair.
Nov. 4-5.....El Paso, Tex., Road Race to Phoenix, Ariz.
Nov. 4-5.....Los Angeles, Cal., Road Race to Phoenix, Ariz.
Nov. 4-5.....San Diego, Cal., Road Race to Phoenix, Ariz.
Nov. 6.....Phoenix, Ariz., Track Meeting, State Fair.
Nov. 24.....Savannah, Ga., Vanderbilt Cup Race, Motor Cups Holding Company.
Nov. 27.....Savannah, Ga., Grand Prize Race, Automobile Club of America.

Foreign

Aug. 28-30.....Ghent, Belgium, Institute of Metals, Annual Autumn Meeting, Ghent, International Exhibition.
Sept. 21.....Boulogne, France, 3-Litre Race.
Sept. 25.....Isle of Man, International Stock Car Race.
October 17-28.....Paris, France, Automobile Show, Grand Palais, 10 days.
November .....London, Eng., Annual Automobile Exhibition, Olympia.

The Week in the Industry

Engineer — Dealer — Repairman — Garage

NEW BOSCH DISTRIBUTORS—The work of covering the United States with Bosch supply stations is being pressed and the increasing facilities to care for Bosch users are speedily taken advantage of. These Bosch distributors were appointed in June and July: The Pennsylvania Rubber & Supply Co., Cleveland, O.; Osburn Automobile Supply Co., Memphis, Tenn.; Lemke Electric Co., Milwaukee, Wis.; Diamond M. C. Co., New Rochelle, N. Y.; W. D. Andrews Co., Syracuse, N. Y.; G. B. Wuestefeld Co., New Haven, Conn.; Newport Engineering Works, Newport, R. I.; Sloan & Clapper, Newburgh, N. Y.; Hamilton & Bertram Motor Supply Co., San Diego, Cal.; J. G. McGrillis & Co., Manchester, N. H.; Automobile Supply Co., Tacoma, Wash.; G. W. Shroyer & Co., Dayton, O.; J. Edward Newton, Fall River, Mass.; Southern Auto & Supply Co., Chattanooga, Tenn.; G. N. Baughman Co., Inc., Tampa, Fla.; McGraw Bros., Jacksonville, Fla., and Fox-Shrycock Auto Co., Fort Wayne, Ind.

DISCONTINUES AGENCY—The Palace Auto Service Co. has discontinued the Hudson agency in Hartford, Conn.

TWO CALGARY COMPANIES COMBINE—The Alberta Rubber & Supply Co. has amalgamated with the Motor Supply Co., Calgary, Alta.

MACAULEY PACKARD VICE-PRESIDENT—Alvan Macauley, general manager of the Packard M. C. Co., Detroit, Mich., has been made also a vice-president of the company.

BUMP JOINS HANDLEY'S STAFF—J. I. Handley, president of the J. I. Handley Co., Indianapolis, Ind., announces the appointment of F. R. Bump as general sales manager.

MOVE TO HOUSTON—J. A. and Kline Bagwell, who have been handling the Overland in Savannah, Ga., are going to Houston, Tex. The salesrooms will be at 215 West Oglethorpe avenue.

MONIHAN COLE DIRECTOR OF SALES—John Guy Monihan, of the Premier Motor Mfg. Co., Indianapolis, Ind., has become associate director of sales and advertising of the Cole Motor Co., that city.

NEW OVERLAND CO.—C. E. Vinson and G. M. Williams have embarked in the automobile business as the Overland Sales Co., in Savannah, Ga. F. E. Brooks will be sales manager for the new company.

O'ROURKE PURCHASING AGENT—J. S. O'Rourke, formerly purchasing agent of the Jackson-Church-Wilcox Co., at Saginaw, Mich., has accepted a like position with the Cartercar Co., at Pontiac, Mich.

APPOINTED FEDERAL TIRE DISTRIBUTORS—G. and E. Tisch, Grand Rapids, Mich., have been appointed western Michigan distributors for the tires and other accessories of the Federal Rubber Mfg. Co., Milwaukee, Wis.

BERDON RESIGNS—A. E. Berdon, former chief engineer of the Esterline Co., and designer of the graphic meters and many other products bearing that name, has resigned from his position with the Indianapolis, Ind., concern.

FOUHY GETS PROMOTION—Manager Thomas J. Glenn of the New England branch of the Firestone Tire & Rubber Co., Boston, Mass., has just promoted Thomas J. Fouhy to the position of advertising manager for the New England district.

WILMINGTON GARAGE A BLOCK LONG—Because of increased business the Wilmington Automobile Co., Wilmington, Del., which already had one of the largest garages there, has doubled the size of the plant and now has a garage a whole block long.

PLANS A STOCK WAREHOUSE—The Ohio Seamless Tube Co., of Shelby, O., plans additions and extensions of $400,000 for the purpose of catering especially to the automobile trade. It is planned to open a stock warehouse in Detroit.

IN NEW QUARTERS—New quarters have been taken at 209 West North street, Indianapolis, Ind., by the Madden-Copple Co., located some time at 521 North Illinois street. The company conducts a general motor car repair and machine work business.

ENLARGING THE BUSINESS—The Garland Automobile Co., with headquarters on Pepperell Square, Saco, Me., has been reorganized and the new firm comprises William A. Gilman and Ira Garland. A larger building will be secured and the business increased.

BATTLE CREEK'S TAXICAB CO.—A modern taxicab system has been installed at Battle Creek, Mich., by William Hoffmaster, who has purchased three Ford taxicabs. Michael Dempsey, formerly manager of the Battle Creek Hack & Bus Co., will be manager.

FERRY SERVICE NOW POPULAR—That the improved ferry service established this year between Wilmington and Penn's Grove, N. J., is popular with motorists is attested by the fact that in July a total of 839 cars were ferried across as against 220 in July of last year.

WELLS INSTALLATION ENGINEER—G. A. Wells has been appointed installation engineer to head a new department of the Autocar Co., New York City, which will concern itself with the study of the delivery and transportation problems of various concerns.

WARREN CHIEF DRAUGHTSMAN—E. F. Warren has resigned from the Regal engineering department to become chief draughtsman at the Studebaker plant No. 10. A. Frey, who has formerly held this position, has been forced to resign because of ill health.

NOT CONNECTED WITH WARNER—The Muncie Gear Works is in no way whatever connected with either the Warner Mfg. Co., Toledo, O., or the T. W. Warner Co., Muncie, Ind. Mr. Warner is interested in the Muncie Gear Works to the extent of a creditor only.

OPENS WHOLESALE ACCESSORY BUSINESS—A wholesale motor accessory and specialty business has been opened at 702-705 State Life Building, Indianapolis, Ind., by the Barrier-Sawin Co. The company consists of Ira L. Sawin and B. Jay Barrier, formerly of Cincinnati, O.

NEW REDCLIFF BUS OUT—The output of another Redcliff, Alta., industry began recently when a 12-passenger omnibus, the first turned out by the Redcliff Motors, Ltd., was delivered to a realty company which has opened a livery service with it between the town and Medicine Hat.

PURCHASE TAXICAB BUSINESS—C. E. Nash, who has been operating an automobile bus service in Kenton, O., has disposed of the business to the firm of Littleton & Critchfield, managers of a garage on West Columbus street. The business will be operated by the purchasers in the future.

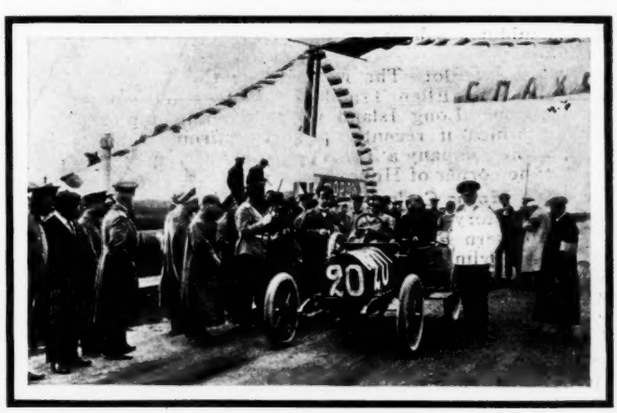
HAWKINS RESIGNS FROM WHITE—C. A. Hawkins, who has been manager of the White Co.'s San Francisco, Cal., branch office ever since the Cleveland O., firm has been marketing cars on the Pacific Coast, has tendered his resignation to take effect August 15. He will be succeeded by G. A. Urquhart.

WOMEN WILL DECORATE AUTOMOBILES—As a feature of the Iron County Fair, to be held at Iron River, Mich., September 15, 16 and 17, something new in the line of an automobile parade will be pulled off. Women will be required to do all the decorating of the automobiles for the parade and they will receive the prizes.

HARRINGTON MAKES A CHANGE—Frederick C. Harrington, formerly connected with the Peerless Motor Car Co., and before that with the Atturbury Truck Co., in Boston, Mass., has been appointed sales manager of the Myer Abrams Co., of Boston, New England distributors of the Lauth Juergens trucks, to take the place of L. C. Harmon, who resigned recently.

KELLY WINS DECISIVE VICTORY—Kelly motor trucks won a decisive victory in the strenuous tests recently conducted by the Detroit Board of Education. The winning truck is manufactured by the Kelly-Springfield Motor Truck Co., Springfield, O. The tests were held in connection with the selection of a 1-ton truck for general hauling for the Board of Education.

OPENS TEMPORARY QUARTERS—The W. J. Marshall Auto Co., which disposed of its garage and Paige agency business to The Wetmore-Quinn Co., has opened temporary quarters at 699 Woodward avenue, Detroit, Mich. Upon the completion of its new building, which is being constructed in



1—Abernathy boys making their stop at the Apico plant. 2—Hupmobile winner of the recent First Grand Prix of Russia

Detroit's newer automobile sales district, this company will take on a new line of cars.

HUP WINS RUSSIAN GRAND PRIX—A 20-horsepower Hupmobile runabout was victor in the recent First Grand Prix of Russia. As winner of this contest the Hupmobile dealer in Russia received a handsome loving cup. It was presented to the driver by Count S. Borskoe San, president of the St. Petersburg Automobile Club. This is an endurance contest somewhat similar to the Glidden tour.

ROMSEY MAKES A CHANGE—D. M. Romsey, until recently with the Henley-Kimball Co., agent for the Hudson car in Boston, Mass., has just been appointed manager of the branch opened at 603 Boylston street, Boston, by the Pettingill Machine Co., of Amesbury, Mass. The company plans to build bodies to order from specially designed ideas of owners as well as take orders for wholesale delivery.

FORDS LEAD IN ST. LOUIS—Figures issued by the State License Commissioner recently show that 279 new automobiles were tagged in St. Louis, Mo., during the month of July. The Fords again were in the majority, 98 of that make being licensed. The Hupmobile, with 18, was next, and the Royal. Reo, Cole and Cadillac were third, with 8 each. The 131 remaining cars were distributed almost evenly among 69 makes.

TAKES OVER RETAIL BUSINESS—The Twyman Motor Car Co., Columbus, O., which has been the distributor for the Studebaker in Ohio and adjoining states for several years, has taken over the retail end of the business in Columbus, formerly handled by the G. E. Thomas Co. The retail department will be conducted at 262-264 North Fourth street, with O. W. Lawson as retail sales manager.

REDUCTION IN TOLLS—A 30 per cent. reduction in toll charges has been put in effect by the Lyme-Saybrook Bridge Co., Hartford, Conn. The former charge for an automobile with two seats was 50 cents; the charge is now 40 cents. For a one-seated car the price has been reduced from 30 to 25 cents. A motor truck is taxed 40 cents to cross the bridge, a motorcycle 10 cents and a steam roller one dollar.

WILL CONTROL CANADIAN TIRE PATENT—The Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont., has concluded arrangements with the Century Rubber Co., Plainfield, N. J., by which the Dunlop company will control for Canada the patent Century fabric-cord tire. The Dunlop company expects to market a very large number of these fabric-cord tires during the balance of the present season. The possession of the Canadian rights will put the company in a very favorable position for succeeding seasons.

MOVES INTO OLDS FACTORY—Because of its rapidly increasing business the Garber-Collins-Buick Co., of Saginaw, Mich., has leased the building formerly occupied by the Olds Motor Works at 318 South Baum street, Lansing, Mich., to which it will remove its offices and sales force. It will continue business at its present location, 209 South Second street, giving the company two well equipped machine and repair shops. The old building will be used in the rebuilding and overhauling of Buick cars, while only adjustments and light repairs will be cared for in the new location.

BIG HARTFORD MERGER—One of the most important changes that has taken place in some time in Hartford, Conn., motoring circles is the merger of the interests of H. D. Graves, Hartford distributor of the Lozier and Henderson cars and proprietor of the Imperial Garage at 120 Allyn street, and those of the Capitol City Auto Co., at the corner of Allyn and High streets. Business will be conducted under the name of the Capitol City Auto Co., of which Graves has been elected secretary. Bernard F. Smith is president and W. F. Dahill treasurer. The concern will handle the Mitchell, Lozier and Henderson pleasure cars and the Stewart truck. The company also conducts a successful taxicab department and operates a well-equipped repair shop.

Recent Incorporations in the Automobile Field

AUTOMOBILES AND PARTS

BALTIMORE, MD.—American Motors Co.; capital, $500,000; to manufacture automobiles.

BUFFALO, N. Y.—Biggam Engineering Co., Inc.; capital, $200,000; to manufacture transmissions, clutches and other parts, and to operate a general machine shop. Incorporators: H. F. Biggam, N. C. McDowell, C. E. Buck.

CHICAGO, ILL.—Electric Auto Sales and Rental Co.; capital, $12,000; to deal in electric automobiles, motor cycles, &c. Incorporators: Nathaniel Rubinkam, H. F. Tucker, G. C. McLaren.

CHICAGO, ILL.—Michigan Motor Car Co.; capital, $25,000; to buy and sell automobiles. Incorporators: W. J. Pierce, E. D. Stuntluff, M. E. Stuntluff.

CHICAGO, ILL.—National Assn. of Automobile Engineers; capital, $2,500; commission and brokerage business and automobile, motor boats, and accessories pertaining thereto. Incorporators: Leon P. Hutchins, A. L. Pettet, William Roles.

CHICAGO, ILL.—T. S. Wheel & Mfg. Co.; capital, $2,000; to manufacture and sell automobiles, accessories, &c. Incorporators: Fred Schulz, T. J. Smulski, Stanley Zukowski.

CHICAGO, ILL.—Woods Mobilette Sales Co.; capital $15,000; to deal in automobiles. Incorporators: F. A. Woods, E. F. Blettner, J. C. Long.

CINCINNATI, O.—Cincinnati Automobile Clearing House; capital, $5,000; to deal in new and second-hand automobiles. Incorporators: Robert Uriche, C. F. Hornberger, A. R. Spangenburg, C. R. Chadwick, S. D. Bromley.

CINCINNATI, O.—The Motor Transportation Co.; capital, $250,000; to manufacture and deal in automobiles. Incorporators: George Schorr, E. H. Hoelscher, W. G. Hoelscher, H. A. Hoelscher, W. S. Vossler.

DETROIT, MICH.—Warner Detroit Motor Works; capital, $100,000; to manufacture automobiles. Incorporators: D. L. Warren, W. A. Gleesen.

DOVER, DEL.—Army Tire Co. of N. Y. City; capital, $1,000,000; to manufacture, sell, and deal in automobiles and all other kinds of wheeled vehicles. Incorporators: G. W. Griffin, F. H. Kessel, L. J. Roll, M. M. Algere, Jr.

GRAND RAPIDS, MICH.—Reed & Blickley Auto Co.; capital, $10,000; to deal in automobiles.

INDIANAPOLIS, IND.—Howe Engine Co.; capital, $50,000; to manufacture motor fire apparatus. Incorporators: B. J. C. Howe, L. M. Howe, H. R. Howe, P. G. Howe, M. W. Popkins.

LOUISVILLE, KY.—Chawk-Smith Automobile Co.; capital, $4,500; to deal in automobiles. Incorporators: J. T. Chawk, William J. Chawk, H. R. Smith.

LOUISVILLE, KY.—Monarch Auto Co.; capital, $10,000; to deal in automobiles Incorporators: C. P. Pierson, Jess Gosnell, G. W. Aydelott, W. L. Kennett, T. G. Summers, A. T. Wingate, C. A. Colley, J. L. Morris, E. Coffman.

NEW YORK CITY.—Carter Car Co. of Pontiac; capital, $600,000; to deal in automobiles. Incorporator: W. S. Williamson.

PHILADELPHIA, PA.—United Traction Improvement Co.; capital, $100,000; to manufacture, sell and deal in automobiles, &c. Incorporators: W. J. Spangler, V. H. Conkle, H. S. Trego.

SPRINGFIELD, O.—Gramont Traction Plow Co.; capital, $600,000; to manufacture traction plows. Incorporators: A. W. Grant, P. A. Montanus, Oscar Kaser, Walter McKinney.

ST. LOUIS, MO.—Wright Auto Co.; capital, $4,000; to deal in automobiles. Incorporators: C. A. Wright, W. B. Wood, A. A. Hopkins.

WILMINGTON, DEL.—E. P. Gerber Co.; capital, $500,000; to design, manufacture, equip and deal in and with automobiles, carriages, cars, &c. Incorporators: O. J. Reichard, W. J. Maloney, N. P. Coffin.

WILMINGTON, DEL.—Maxwell Motor Sales Corp.; capital, $10,000; to deal in automobiles.

WILMINGTON, DEL.—National Rotary Power Co.; capital, $2,500,000; to manufacture, repair and dispose of engines, machines and motor boats.

GARAGES AND ACCESSORIES

AKRON, O.—Anti-Rust Co.; capital, $20,000; to deal in automobile accessories. Incorporators: C. T. Grant, Frank Rice, Lena Dewey, Bessie Rice, Alex. Sicherman.

BARNESBORO, PA.—Barnesboro Auto & Machine Co.; capital, $25,000; to repair automobiles. Incorporators: J. L. Berkebile, N. K. Harris, J. R. Musser, W. S. Wheeling, J. M. Grennan.

CARTHAGE, MO.—Lampher Rubber Tire Machine Co.; capital, $20,000; to manufacture the Lampher machine for setting rubber tires. Incorporators: W. E. Brinkerhoff, Joseph Herrin, Earl Lanpher, John Dermott.

CHICAGO, ILL.—Chicago Tire Goods Co.; capital, $10,000; to deal in automobile accessories. Incorporators: Louis Dulsky, Samuel Dulsky, J. E. C. Blake.

CHICAGO, ILL.—Claremont Garage; capital, $2,500; garage and repair shop. Incorporators: J. F. Hutchinson, Jacob Diamond, A. S. Winslow.

CHICAGO, ILL.—Jennie Gasoline Extracting Co.; capital, $25,000; extraction of gasoline from natural gas and selling and disposing of same. Incorporators: J. N. Lucas, T. R. Barron, B. M. Osbun.

CHICAGO, ILL.—Turbine Muffler Co.; capital, $2,400; to manufacture and sell turbine mufflers and other automobile accesssories Incorporators: Joseph Libal, G. W. Gardner, J. J. Karcheiser.

INDIANAPOLIS, IND.—Wilcox & Herr; capital, $500; to do an automobile taxicab and transfer business. Incorporators: H. S. Wilcox, D. H. Herr, B. W. Rout.

MOUNT VERNON, N. Y.—Mount Vernon Auto Station; capital, $3,000; to repair automobiles. Incorporators: William Bunn, LeRoy A. Preston, Lucy Preston.

NEW YORK CITY.—Auto Supplies Export Co.; capital, $5,000; to deal in automobile supplies. Incorporators: F. W. Keegan, L. M. Fay, Antranik Aprahamian.

NEW YORK CITY.—Packard Transportation and Repairing Co.; capital, $3,000; to repair automobiles. Incorporators: John Santora, Anna T. Vacarelli, F. P. A. Vacarelli.

NEW YORK CITY.—Peerless Non-Puncture Co.; capital, $600; to manufacture preparations for rendering tires puncture proof, &c. Incorporators: Maurice Uran, Harry Citret, Frank Eber.

NEW YORK CITY.—Tyre Service, Inc.; capital, $10,000; to deal in automobile accessories. Incorporators: J. C. Travis, C. L. Cline, M. M. Hovey.

NEW YORK CITY.—Walzer Corp.; capital, $10,000; to deal in automobile supplies. Incorporators: Charles Prebner, Samuel Sperling, Solomon Strauss.

PITTSBURG, PA.—Axwell Equipment Co.; capital $5,000; to deal in automobile supplies. Incorporators: F. Patterson, W. J. Mulvihill, J. R. D. Huston.

ST. LOUIS, MO.—Keppel Mfg. Co.; capital, $50,000; to manufacture check valves, automobile starters, &c.

WILMINGTON, DEL.—Mecca Automobile Society; capital, $50,000; to carry on an automobile club. Incorporators: C. M. Miller, W. F. Vashell, L. T. Layton.

CHANGE OF NAME AND CAPITAL

BRIDGEPORT, CONN.—Blue Ribbon Garage Co.; capital reduced from $100,000 to $60,000.

New Agencies Established During the Week

PASSENGER VEHICLES

Place	Car	Agent
Alpine, Tex	Chandler	Young & Edwards
Billings, Mont	Chandler	W. W. Green
Detroit, Mich	Paige-Detroit	Wetmore-Quinn Co.
El Paso, Tex	Chandler	Tri-State M. C. Co.
Gloucester, Mass	Chandler	R. C. Wells
Grundy Centre, Ia	Chandler	Hawn & Frost
Houston, Tex	Chandler	J. C. Clinton
Independence, Ia	Chandler	Myers, Cowell & Co.
Kansas City, Mo	Chandler	White Motors Co.
Kansas City, Mo	Regal	Ernest Epley
Kerrytown, N. Y	Chandler	Koenig Bros.
Logan, Ohio	Maxwell	Hocking Valley Auto Co.
Louisville, Ky	Chandler	Louisville Lozier Co.
Marquette, Mich	Chandler	Asire & Palmer
Memphis, Tenn	Chandler	Chandler Sales Co.
Minneapolis, Minn	Chandler	Northwestern Auto Co.
Newark, N. J	Franklin	Mallon & Earle, Inc.
Pine Bluff, Ark	Apperson	Mann M. C. Co.
Richmond, Va	Chandler	B. A. Blenner
Rockford, Ill	Chandler	A. D. Hutchins
Russellville, Ark	Ford	Radsdale Auto Co.
Salt Lake City, Utah	Chandler	W. H. Tobin
San Antonio, Tex	Chandler	Lozier Co. of San Antonio
Schenectady, N. Y	Chandler	B. A. Burtis
Springfield, Mo	Franklin	H. E. Seeley
Stockton, Cal	Franklin	Novelty Garage
Washington, Pa	Chandler	C. B. McAllister Co.
Waverley, Ia	Chandler	V. A. Birum

COMMERCIAL VEHICLES

Chicago, Ill	Star	Austin Doyle's Sons

Accessories for the Automobilist

SAND for Slippery Places—Fig. 1 shows a new device put out by the Auto Sand Grip Co., 690 Woodward Ave., Detroit, which, when attached to any car, ought to add to the safety of city driving. On each running board is placed a metal box, about the size and shape of a tool box. Running diagonally across the interior of it is a tight fitting partition. In the floor of the upper compartment are four holes, which are normally closed by the ends on the plungers. Above the plungers is a coil which acts as an electromagnet and when a current is sent through the coil, the rod and the plungers, rigidly fastened to it, are quickly drawn up. A touch of the push button on the steering wheel will make the plungers jump off their seats and the sand carried in the boxes will spread before each rear wheel. The instant the current is broken again, by taking the pressure off the button, the holes are closed. It should be noted that provision for carrying tools and other articles is made in the lower half of the box, which is accessible by the door at the end. The sand for use in these boxes is of very uniform size and is kiln dried. Enough is carried in a filling so that the actual time of continuously running to empty it is 65 minutes. It is put up in 25-pound sacks for sale at garages.

New Hartford Shock Absorber—The Hartford Suspension Co., Jersey City, N. J., has brought out an automatically graduated type of shock absorber, which operates, however, practically on the same principle as the former types, with which the automobile world has long been familiar. The device is shown in Fig. 3, and it is seen how studs A and B serve for attaching the arms C and F of the absorber to the spring clip and chassis frame respectively. The center arm C operates the auxiliary arms D and E which are called second and third degree arms; the latter is on the same side of the device as the dial K. Integral with the arm C is the pin P which operates the auxiliary arms D and E. In the center, where C and F are joined together, are two friction washers, one being on each side of the annular end of the arm C working between the ends of the double arm F. The adjustment parts, dial K, spider spring H and indicator M are the same in this model as they were in earlier ones. The spider spring compensates automatically for slight wear on part of the friction washers, after the pressure of these against the arm ends has been adjusted. The action of the new device, here shown, is automatic in the following manner: If a fairly smooth road is travelled over, only arm C works between D and E which remain stationary. If a hard, high or low spot in the road in encountered, however, arm C picks up and operates arm D through the pin P, which of course results in the double friction being opposed to the shock action. If the road grows still worse, the arm E is also brought into action.

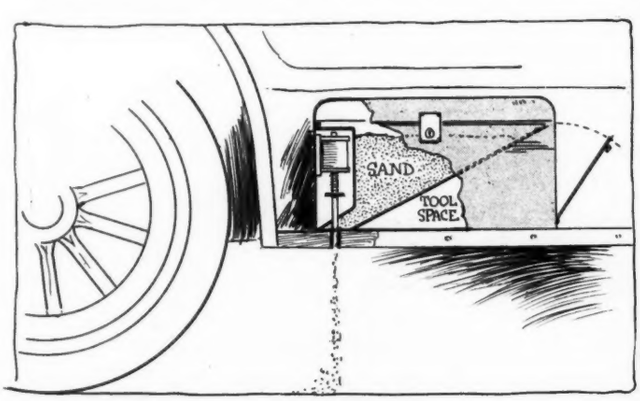


Fig. 1—Apparatus for sand spraying to prevent skidding

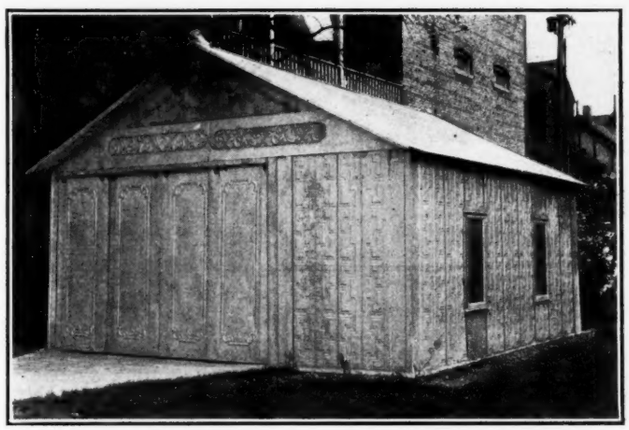


Fig. 2—Pruden portable garage, made of heavy gauge steel

Cox Rebound E-zer—The Cox Brass Mfg. Co., Albany, N. Y., has at last joined the ranks of shock absorber manufacturers and is putting out a rebound snubber or absorber, Fig. 4. This device operates on the principle of a coil spring which expands or is compressed in consequence of a shock administered to the car spring to which one end of a strap is fixed, while the other end is secured to the coil spring. The latter is inclosed in a horizontal cylinder bolted to the chassis, or in case of a full-elliptic spring, is clipped to the upper spring half. The outside end of the rebound strap is secured to the spring by the clipping mechanism here illustrated. The action of the device is simple and positive, as long as the coil spring inside the horizontal cylinder remains well in tune. If the wheel, for instance, strikes a bump, the lower spring half or spring is flattened and lifted, bringing it nearer to the upper half or chassis, respectively. Thus, the strap is slackened for an instant, but the slack is immediately taken up by the expansion of the coil spring in the cylinder. When the spring comes back to its original shape, it tends to compress the spring to the ordinary degree of pressure, but as the strap passes between the cylinder top cover and an automatic friction clamp, the sudden return or rebound of the spring is prevented. If the wheel drops into a rut, the strap is drawn taut, and the sudden return of the coil spring from the compressed to the ordinary state is prevented by the frictional engagement of the strap and the clasp.

Everlastingly Good Ford Light Outfits—It is well known that the Ford magneto, which is housed in the flywheel of the motor, generates so much current that it not only easily satisfies the needs of the ignition system, but that the latter could be well served and yet a considerable amount of elec-

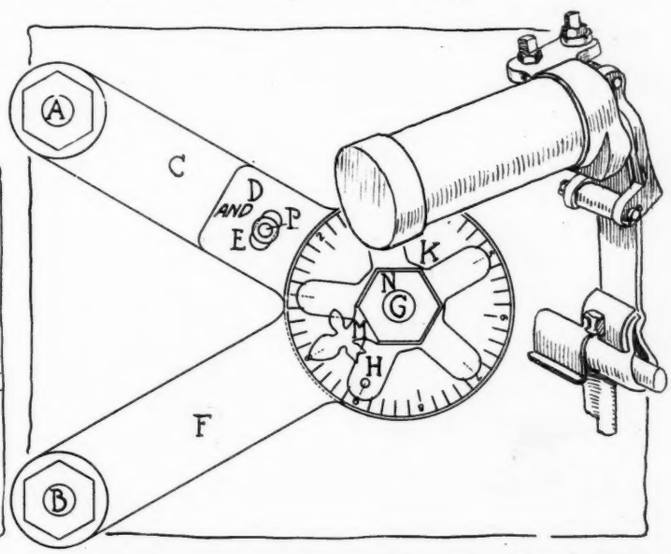


Fig. 3—New Hartford shock absorber. Fig. 4—Cox rebound E-Zer

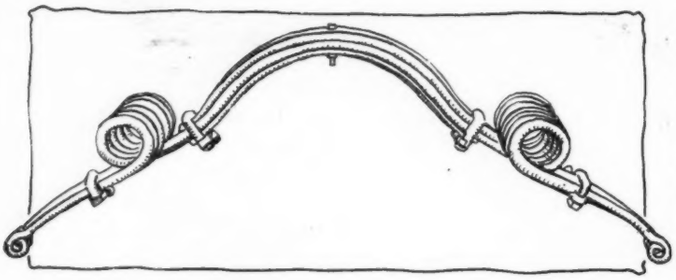


Fig. 5—Thomas coil-equipped rear spring for Ford automobiles

tricity be used for some other purpose. This fact has been taken as a basis for working out electric lighting systems for Ford cars, and the latest equipment of this class is the Everlastingly Good outfit, so called, the initials being identical with those of the manufacturing firm, the Emil Grossman Co., 250 West Fifty-fourth street, New York City. This company, whose products have been well known among automobile users and dealers, has designed its system in such a way that efficiency and nice appearance have been attained in combination with a very low cost of production and consequently price of sale. Fig. 6 illustrates the outfit, consisting of a pair of solid brass reflectors, two Ediswan sockets and connectors, the necessary wire—the special product of the Grossman concern, Red Rib wire, has been used—and a hard-rubber switch. The outfit can be had with either 8 or 9-inch reflectors finished in nickel or silver. An exact instruction sheet giving the proper method of installing the equipment goes with each outfit.

Pruden System Portable Garage—A portable steel garage of interchangeable unit design is being made by the Metal Shelter Co., 3 West Water street, St. Paul, Minn. Fig. 2 illustrates this type of garage. It is constructed of heavy gauge, galvanized steel which is both rust proof and so designed that it thwarts the efforts of the would-be joyrider most effectively. Any part, if lost, can easily be refurnished by the manufacturer, and erection as well as disassembling of the garage building are very simple matters. It hardly remains to say that the building is of very fine appearance, as this is amply brought out by the illustration here shown.

Thomas Coil Spring for Fords—The Thomas Auxiliary Spring Co., Canisteo, N. Y., manufactures a rear cross spring destined to take the place of the spring which is originally furnished with Ford cars. This spring is, as Fig. 5 shows, an upwardly arched steel spring, the master leaf of which is coiled near its two ends so as to provide the coil spring action in addition to that of the elliptical curvature, which of course makes for easier riding. The steel used in this spring is specially tempered to obtain the best results possible. The manufacturer sends these springs on free trial.

Jacobson Garage Type Compressor—In order to satisfy the requirements of garages, the Jacobson Mfg. Co., Warren, Pa., manufactures a line of air compressors which are to be used in connection with a storage tank. Each unit made by the company consists of a heavy base carrying the electric motor and compressor, the latter being driven from the former by means of an endless leather belt. In Fig. 7, the latest type made by the Jacobson concern is shown, and while in general respects it resembles the various models now in use in automobile garages, this latest design is distinguished by a number of detail improvements. Among these is specially noteworthy the arrangement which makes the apparatus entirely automatic, namely, the starting and stopping switch. If the pressure in the storage tank sinks below 80 pounds per square inch, the motor is started and operates the compressor until the maximum pressure of 125 pounds is attained, when the switch automatically cuts out the motor. The compressor type here shown has 3 inches bore, 4 inches stroke and works at 200 revolutions per minute, thereby taking 3.25 cubic feet at atmospheric pressure, which volume is forced into the tank through a .5-inch pipe. The outfit covers a space of 24 by 48 inches and weighs 400 pounds completely assembled.

O'Brien Window Regulator—The so-called Limousine window regulator, made by the Joseph F. O'Brien Mfg. Co., 61 Park Place, New York City, is so constructed that a window may be shifted to any height and remain there securely, without rattling and without having to be attached or held in place in any manner controlled by a passenger of the car. This end is obtained by the use of two spring balances for each window which are equivalent to the window weight and are carried below the window; a bronze cable connects the balance and the top of the window, being laid over a pulley out of sight and carried through the window frame. In the case of frameless windows, the cable is attached to the fence rail molding at the bottom of the window. Fig. 8 illustrates the device.

Doxameter Gasoline Saver—The Doxameter Co., 2132 Michigan avenue, Chicago, makes the Doxameter device, Fig. 9, which serves for reducing the fuel consumption of automobiles, especially when climbing hills. This device is, in principle, an auxiliary air valve consisting of an air cylinder containing a hollow, perforated piston, and of a T member, one end of which is closed and the other threaded into the intake manifold. The device is mounted horizontally, this applying to the axis of the T member as well as to that of the cylinder. The mechanism of the apparatus is seen in the lower half of the illustration, where the piston movable in the cylinder is shown. This piston is open at the end facing the T member, but closed at the other, near a hole cut through the cylinder, and the mantle section of the piston is perforated with a number of small holes. A spring behind the closed piston end presses the piston against the T member, and, there being a sliding fit between the piston surface and the inner surface of the cylinder, all the air entering the manifold must come through the carbureter intake. If, however, the head of the piston rod which protrudes through the free end of the cylinder is pulled by a cable which is part of the device, the piston is withdrawn from the proximity of the T member and the

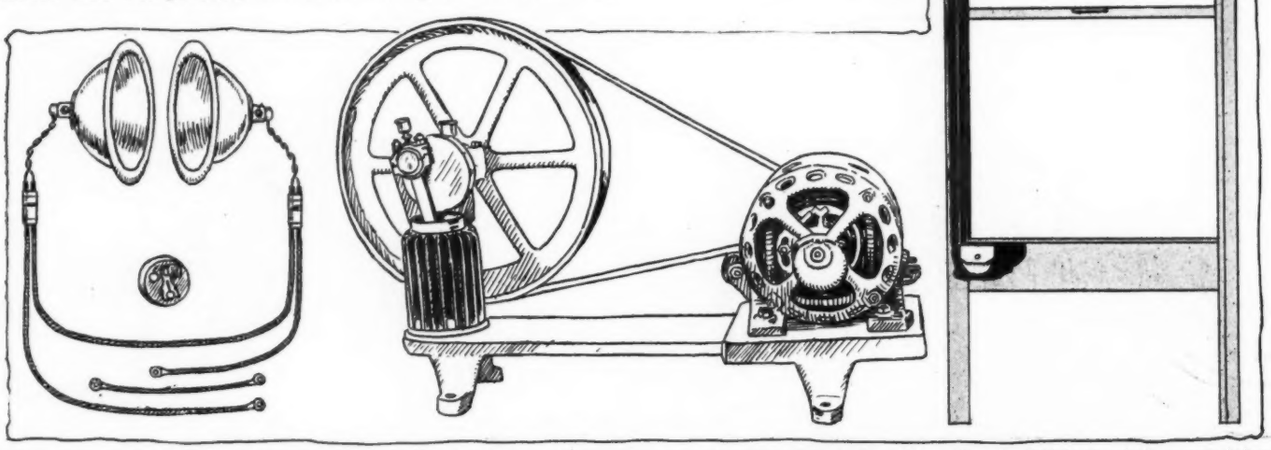
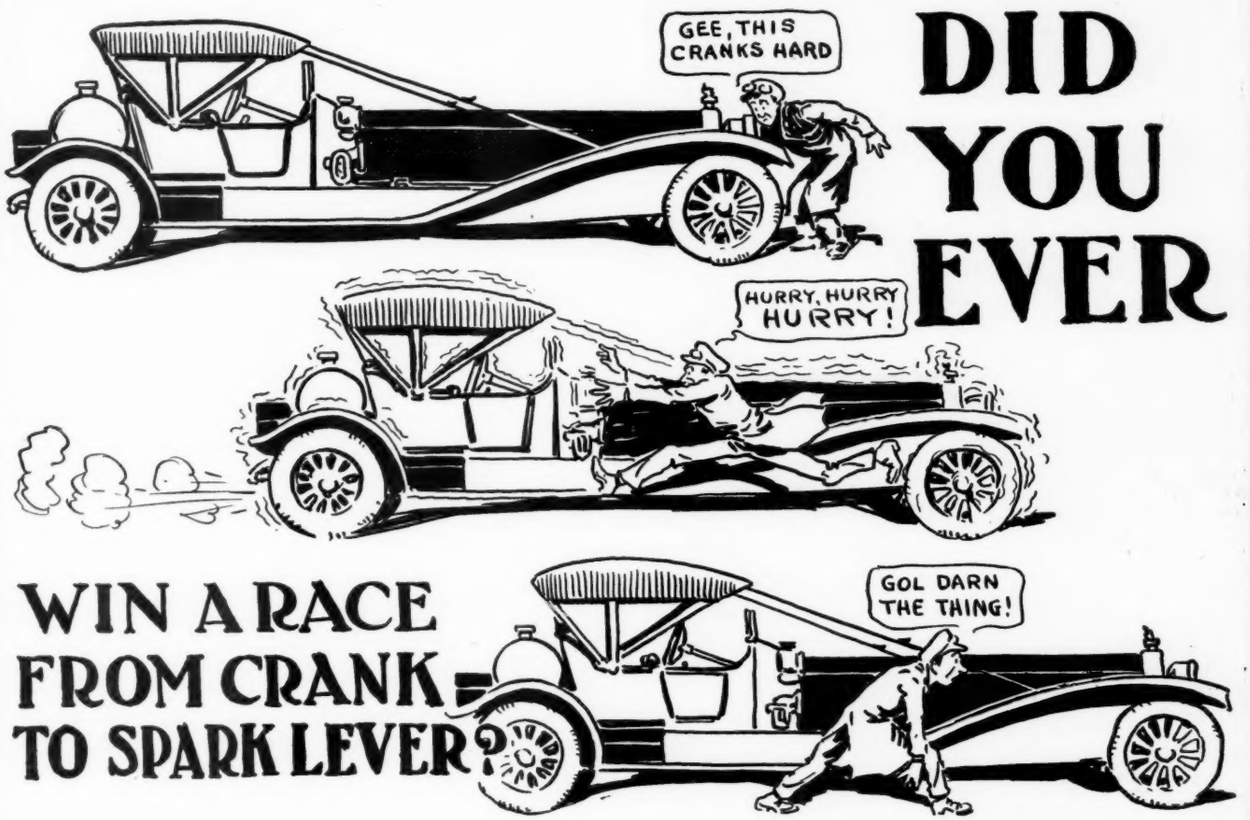


Fig. 6—E. G. electric outfit for Fords. Fig. 7—Jacobson air compressor for storage tank equipments. Fig. 8—O'Brient window regulator



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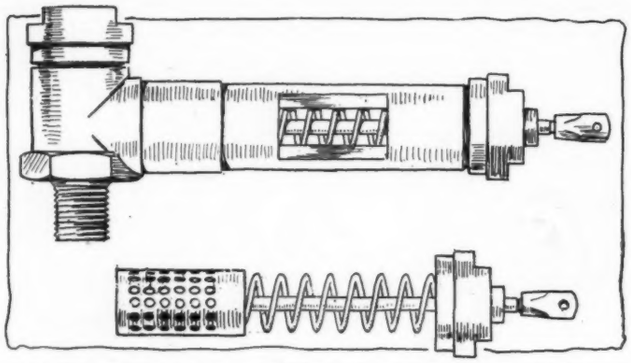

Fig. 9—View of Doxameter fuel saver and section of piston

perforations in it are exposed to the external air on account of the slot or passage cut into the cylinder about its middle. Consequently, the motor suction draws air through the Doxameter, as this way the air encounters only the negligible resistance of the friction in the perforations, and the mixture is thereby thinned to the proper degree. In order to allow only the required amount of air to pass into the intake manifold, a check valve is installed in the passage where the cylinder opens into the T connection, and this valve is so constructed as to have only a certain capacity at any given motor speed. The Doxameter is connected to a lever or pedal in reach of the driver, and, if desired, may be operated conjointly with the carbureter throttle, although separate control is preferable.

Stromberg Double Fuel Strainer—The Stromberg Motor Devices Co., Chicago, has devised a fuel strainer which will be included in the company's carbureters for the coming season. This strainer has been designed with a special view toward efficacy, that is, cleaning the fuel entirely of all dirt and other foreign matter. In order to attain this end, the Stromberg engineers have decided upon the use of a double wire gauze strainer, or rather two such strainers which are secured to the carbureter body at the gasoline intake passage and directly above the drain cock. The lower strainer is thimble shaped and of close mesh so as to take up all foreign matter, practically, but to insure positively clean fuel, the second strainer, a flat screen placed above it, is used, and the achievement of the aim thereby insured. As such a screen, if placed in the passage of a gasoline stream, does not permit water to pass through it, the small drops of the latter, which may be contained in the fuel, are held back by the screen and thence drop to a cup below the thimble, whence they can be drained by turning open the cock.

Foreign Trade Opportunities

Selling Chances in Strange Countries Which Automobile and Accessory Makers Can Turn Into Profitable Export Trade

AUTOMOBILE Fire Truck and Hose—A report from an American consular officer in Canada states that $2,500 has been appropriated by a city in his district for the purchase of automobile fire truck and hose. Those interested should communicate with the person named in the report. Inquiries should be sent to the Bureau of Foreign and Domestic Commerce, Washington, D. C. File No. 11367.

Fire Apparatus, Etc—A report from an American consul in a European country states that the officers of a municipality in his district are considering the formation of a corps of paid firemen. Some of the articles already recommended are the following: Motor truck for the transportation of supplies provided with a steam pump, a 60-foot telescoping ladder, water-tight diving suits, hand pumps, leather and canvas hose, chemical pump, rope ladders, etc. Further details may be obtained from the Bureau of Foreign and Domestic Commerce. File No. 11377.

Motor-Car Parts, Etc.—An established firm of wagon and carriage builders in Africa is converting its factory for the manufacture of various automobile bodies and for assembling the parts and building motor cars and motor cycles from materials shipped knocked down. It is also engaged in general repair work. Catalogues of the various parts required for such repairs and of all accessories likely to be needed in such a factory are desired. Catalogues should also be forwarded to the American consulate through which the request was made. File No. 11315.

Leather Cloth for Upholstering—An American vice-consul in Italy reports that a business man who states he is in a position to furnish the best of references desires to receive offers carrying with them exclusive agency rights for all Italy from American manufacturers of enameled leather cloths for automobile and furniture upholstering. Correspondence in English. File No. 11318.

Cycle Cars—An American consular officer in England transmits the name of a person in his district who desires to negotiate with American manufacturers of cycle cars with a view to establishing agencies in the United Kingdom. File No. 11327.

Motors and Motor Boats—A mechanical and electrical engineer in Asiatic Turkey informs an American consular officer that he desires to represent an American manufacturer of marine motors and botor boats of steel or wood. He will accept an agency on a commission basis. Catalogues and price lists, with discounts c.i.f. a certain port, are requested. Reference may be furnished. File No. 11345.

Benzine and Gasoline Tractors, Gang Plows and Stationary Engines—A business man in a European country requested an American consul to place him in touch with manufacturers of benzine and gasoline tractors, gang plows and stationary engines, gasoline, from 2 to 20 horsepower. The consul states that benzine and gasoline tractors are gradually replacing cable-drawn plows for deep plowing on the sugar plantations. Correspondence should be in the German language. File No. 11350.

Automobile and Motor Boats—A report from an American consul in Canada states that an automobile and motor boat association with a large and influential membership has recently been organized in his district. The consul suggests that American manufacturers of automobiles and motor boats and parts thereof send catalogues and other particulars to the address given in the report. File No. 11230.

Rubber Tires—A carriage dealer informs an American consular officer in France that he desires to enter into direct communication with American manufacturers of solid rubber tires. Correspondence in French. File No. 11235.

Antiskid Chains—A firm in England requested an American consul to place it in touch with manufacturers of antiskid chains for automobiles, as there appears to be a market for same in one of the British possessions. File No. 11278.

Automobile Agency—An American consul in a European country reports that a resident of his district desires to obtain the agency for a low-priced American automobile. Owing to the freight and duty it is believed that it will be necessary to import only the chassis and buy the bodies locally. Offers should be made f.o.b. New York, and prices should not include tires. Descriptions should state weight and size of car packed. Offers should be made through the consulate referred to. File No. 11180.

Engines and Motors—An American consul reports that within the past few years there have been imported into the city in which he is located between 15 and 20 kerosene-burning motors of from 5 to 70 horsepower, and 40 or 50 more similar motors have been installed in the adjacent towns of his district. Many owners of kerosene-burning motors are replacing them with the Diesel motor. It is thought that there will be an extensive demand in the immediate future for engines burning fuel oil, and American manufacturers would do well to take steps to supply this market. Copy of the complete report, giving further detailed information, may be obtained from the Bureau of Foreign and Domestic Commerce. File No. 11135.

Electrical Specialties and Motor-car Accessories—A business firm in Great Britain manufacturing electric lamps has advised an American consular officer that it is desirous of securing sole agencies for American high-grade specialties pertaining to electric light or power installation, and for high-grade motor-car accessories or specialties. In communicating with this firm American manufacturers should send catalogues and literature in duplicate, also samples of their goods, if possible. File No. 11143.

Automobile Tops and Paints—A large carriage maker in a European city making a specialty of repairing automobiles, informs an American consulate that he desires very much to secure American material used in covering automobile tops. He desires that American houses corresponding with him should send samples and price lists. He is also interested in the special paints, oils and varnishes used in renovating automobiles. Correspondence is preferred in Russian, German or French. File No. 11092.